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SUBCOMMITTEE ON MEDICAL CARE, AMERICAN PUBLIC HEALTH ASSOCIATION: Utilization of other professional health workers under competent medical supervision is essential to service of high quality. The full range of medical care today includes the services of the physical therapist, the clinical psychologist, and the occupational therapist, as well as the optometrist and the podiatrist. Each of these groups has a significant contribution to make in the treatment and rehabilitation of the patient. The importance of interprofessional teamwork and closer coordination of the activities of all types of health personnel cannot be over-emphasized. . . .

. . . Prevention no longer deals only with preventing the initial onset or occurrence of disease. It also means preventing the continuance of progress of disease which has already occurred; it means preventing the development or persistence of disability or invalidism, and of dependency, destitution, and other undesirable social effects. In other words, effective preventive service requires prompt, comprehensive, and continued personal care as well as community service of the kind traditionally associated with public health activity. . . .

. . . Provision should be made—in conjunction with public health agencies—for mass screening programs utilizing such newer techniques as the 70 millimeter chest x-ray and the micro-chemical diabetes test. Such health inventories are made feasible only by the removal of the financial barriers confronting the supposedly healthy individual and by the assurance of medical care for disorders which come to light. An essential component of these appraisals should be health guidance for the entire family. Reported in "The Quality of Medical Care in a National Health Program," *American Journal of Public Health*, July, 1949, pages 906 ff.

Causes and Prevention of Blindness in Children*

C. Edith Kerby, *Associate for Statistics and Analysis*
National Society for the Prevention of Blindness

EYE conditions among pupils in schools for the Blind in the United States, 1947–1948.

THE number of children in schools and classes for the blind in the United States in 1948 was 5,500, or approximately one in 5,000 of the entire school enrollment. At the present time about 850 new pupils are entering braille classes each year. These facts should be a matter of grave concern not only to the parent of a blind child, but to the physician, nurse, teacher, and social worker as well. They may realize their responsibility for serving a blind child who may be brought to their attention, but they should also be interested in the related problems of prevention of blindness in children, and what can be done about them. A series of statistical studies of causes of blindness among children of school age made by the Committee on Statistics of the Blind provide basic data on this subject for their guidance.

The Committee's report for the year 1947–48 covers about 71 per cent of all braille students in the United States. The age range is that usually found in any elementary and secondary school group, except that a school for the blind occasionally accepts a child of preschool age and may be obliged to extend the education of some students well beyond the teen age if for any reason their formal education has been delayed during childhood and youth. The group represents those whose blindness occurred at any time from the prenatal through the adolescent years. In over one half (54 per cent) of the cases blindness occurred before birth and 80 per cent were blind before 5 years of age. (See Chart No. 3.)

* A Report for the Committee on Statistics of the Blind. The Committee on Statistics of the Blind, and particularly the National Society for the Prevention of Blindness, acknowledge with grateful appreciation the assistance of school ophthalmologists and superintendents who are cooperating in these studies.

In this study data on causes of blindness are compiled in a cross-tabulation showing both the nature of the eye affections and their underlying causes. Hence, it is possible to note the etiological factors that may be responsible for any specific eye condition, such as cataract, optic atrophy, choroiditis, retinal detachment, or a structural anomaly. It also shows the many ways in which syphilis, other

TABLE I. CAUSES OF BLINDNESS BY ETIOLOGY—SCHOOL YEAR, 1947–48*

ETIOLOGY	Per Cent of Total Pupils Enrolled
Infectious Diseases	**16.8**
Ophthalmia neonatorum	7.5
Syphilis	3.2
Meningitis	1.3
Measles	0.7
Tuberculosis	0.5
Septicemia	0.5
Other and not specified	3.1
Injuries	**7.6**
Play or sport	4.8
Birth injuries	1.1
Traffic and transportation	0.5
Other and not specified	1.2
Poisonings	**0.2**
Tumors	**3.8**
General Diseases	**1.2**
Prenatal Origin	**61.0**
Hereditary (established or presumed)	15.7
Cause not specified	45.3
Etiology Undetermined or Not Specified	**9.4**
Total—All Causes	**100.0**

* Based on 3,905 eye examination records of pupils in 39 residential schools and 12 city school systems in 35 states and the District of Columbia.

infectious diseases, general diseases, accidents, or heredity may affect the eyes. Based on the large cross-classification, condensed tables showing only the more important items in these two classifications are presented.**

** The complete set of tables compiled by the Committee on Statistics of the Blind is available from the National Society for the Prevention of Blindness at cost: 20 cents per set.

The first and most startling fact to be noted from this table is the large percentage for which the time in the life cycle but not the cause of blindness is known. Over 45 per cent of the total cases were classified as "prenatal origin, cause not specified," and the rate is increasing. Blindness of this type is not now being prevented because we do not yet have adequate knowledge of the factors in the prenatal period which may lead to blindness. This situation seems particularly tragic when we realize that blindness which exists from birth means many more years of blindness and, hence, many more problems both for the affected individuals and for society.

Need for Research

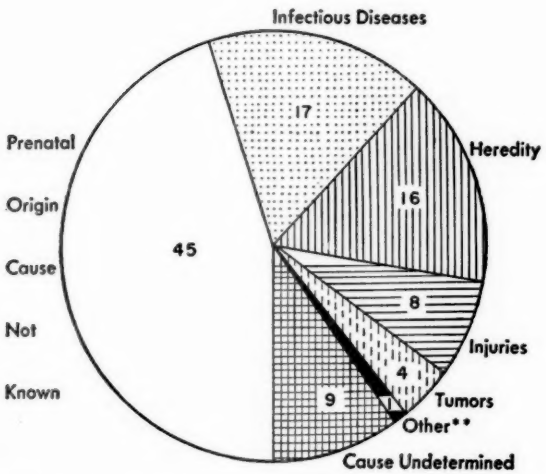
Limited research in this field is already under way. For example, the American Academy of Pediatrics and the National Society for the Prevention of Blindness are joint sponsors of a project, centered at the University of Kansas Hospitals, Kansas City, Kansas, in which the relationship between congenital eye defects and German measles or other infectious diseases in pregnancy is being investigated. Groups of ophthalmologists, pediatricians and other specialists in many of the leading medical centers of the country are endeavoring to discover the cause or causes of retrolental fibroplasia (opaque fibrous membrane behind the lens). This is a very serious developmental abnormality of the eye which occurs chiefly in the tiny premature infants who survive the other hazards of premature birth because of special provisions for their care. Other groups, notably the University of Michigan, are investigating the problem of heredity. Such research projects are vital to progress in prevention of blindness among children, but there are not enough of them. Intensive and extensive research in which all aspects of the problem can be investigated is badly needed.

The existence in our current statistics of this large group of cases of prenatal origin, cause not specified (45 per cent), and of the 9 per cent of cases classified merely as "etiology undetermined or not specified," indicates also that many of the individual case records are unnecessarily incomplete. The reason for this lies in the limitations of the current method of obtaining the facts. It is true that each child has had an ophthalmological examination soon after entering the school for the blind. Unfortunately, however, the school ophthalmologist does not see the child until long after the onset of blindness. Further, parents are not present at the examinations to supply pertinent facts regarding the general and eye health history of the child and his family, and the school ophthalmologist lacks the information which could be contributed by physicians, hospitals, public health nurses or

social workers who may have served the child previously. Hence, while the ophthalmologist can determine the nature of the eye condition from his own examination, he is frequently unable to state the etiology.

Chart No. 1

Causes of Blindness in Children of School Age*



* Based on 3,905 eye examination records of pupils in 39 residential schools and 12 city school systems in 35 states and the District of Columbia.

** Includes general diseases and poisonings.

Need for Social Service

Very few schools for the blind have a social worker who might make the necessary case studies. However, the school superintendents could enlist the cooperation of child welfare or public health authorities in each child's home community for such service, or a state public health agency might undertake to do this for all of the school's pupils. If a state agency could be made responsible for coordination of the health, welfare and educational services to visually handicapped children of all ages, its centralized files could, undoubtedly, become a veritable storehouse of information for research purposes. At the present time medical histories of individuals and families are widely scattered.

Infectious Diseases

Among the cases of blindness in which cause is known the most important are the infectious diseases. About one sixth of the total braille students enrolled in 1947–48 were blind because of some infectious disease. Ophthalmia neonatorum heads the list, with 7.5 per cent, then syphilis (3.2), meningitis (1.3), measles (0.7), septicemia (0.5), and tuberculosis (0.5). The percentage attributed to syphilis in these studies is believed to be understated, as many cases of a type that might have been caused by syphilis are diagnosed "etiology unknown." It should be noted, however, that these figures do not represent the rate at which new cases are occurring. During the period

TABLE II. CHANGES IN CAUSES OF BLINDNESS, FROM 1935–36 TO 1947–48*

ETIOLOGY	Per Cent Change 1936 to 1948	
Infectious Diseases		−46
Ophthalmia neonatorum	−39	
Syphilis	−50	
Other and not specified	−51	
Injuries		−25
Play or sport	−14	
Other and not specified	−36	
Poisonings		†
Tumors		+51
General Diseases		‡
Prenatal Origin		+17
Hereditary origin, established or presumed	+21	
Prenatal origin, cause not specified	+16	
Etiology Undetermined or Not Specified		− 5
All Causes		− 6
Per cent decrease in U. S. population of school age, −9		

* Unit groups included in this table are those for which data are available for both years. Data cover cases in the following states: Arkansas, Illinois, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, New Hampshire, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, Rhode Island, Vermont and Wisconsin.

† Number of cases increased, but group is small and hence percentage change is not significant.

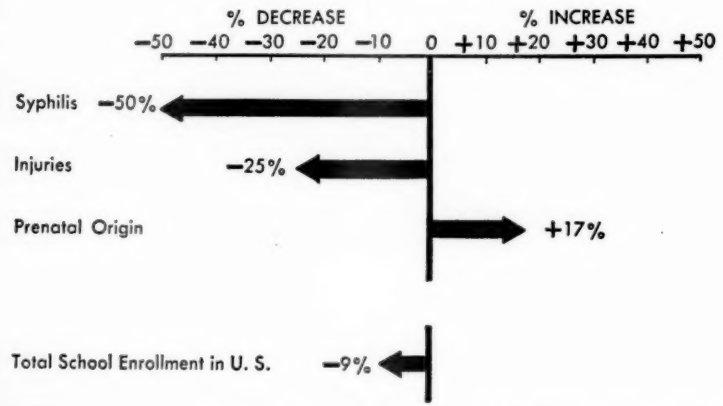
‡ Number of cases decreased, but group is small and hence percentage change is not significant.

covered in our studies the percentage of blindness due to most of the infectious diseases has shown a marked decrease, as shown in Table II.

Chief credit for the reduction in blindness due to infectious diseases should be given to the federal, state and local public health authorities, although they would be the first to acknowledge the value of the assistance provided by voluntary agencies. Prevention of blindness

Chart No. 2

Trends in Causes of Blindness in the School Age Group from 1935-36 to 1947-48*



* Unit groups included are those for which data are available for both years. Data cover cases from 18 states.

agencies take pride in the fact that they took the lead in stimulating the mandatory use of a prophylactic in the eyes of the newborn and other control measures to prevent blindness from ophthalmia neonatorum. These agencies have also cooperated in the social hygiene legislative program which makes prenatal and premarital blood tests mandatory. Through such legislation syphilis in the parents may be discovered, and treated, as a preventive measure against prenatal syphilis in infants. The results fully justify these efforts. There has been a reduction of more than 90 per cent in blindness due to ophthalmia neonatorum among new pupils entering schools for the blind from 1907 to 1948 and about a 50 per cent reduction in blindness from syphilis between 1936 and 1948. We no longer have in our schools for the blind any cases of blindness due to smallpox.

Heredity

The next most important cause of blindness in the school age group is heredity. The data show that nearly 16 per cent of the total cases were of hereditary origin, and this figure is probably understated. Unfortunately, they indicate also that blindness from this cause is increasing. Some of this increase may be apparent rather than real, since case records which the Committee has accumulated over the years has enabled us to discover familial relationships not previously noted by the schools or their examining ophthalmologists. Unless the case histories of all members of a family are considered as a group, it is unlikely that genetic origin will be established. Hence, there is little chance that the facts will be used by ophthalmologists or family physicians as a basis for advice to the only persons who can prevent blindness from this cause—the prospective parents in affected families. The size of the group whose blindness is of hereditary origin provides additional proof of the importance not only of intensive study of each case to establish the cause, but of centralization of case files. For hereditary cases, it is probable that centralization on a national basis should be considered, since there is considerable migration of the blind population from state to state.

Injuries

Third in order of frequency are the cases of blindness due to injury. These amounted to approximately 8 per cent of the total cases. Accidents in play or sport accounted for 4.8 per cent; birth injuries for 1.1 per cent; and traffic accidents for 0.5 per cent. The most serious types of eye injuries to children are caused by sharp or pointed objects, blows or falls, dynamite caps or other explosives, and BB guns. Cases of blindness from fireworks have been decreasing in our statistics during the past ten years due to the increasing number of state laws controlling their use and also to restriction on manufacture of fireworks during the war years. Now that the latter restriction has been removed fireworks are once again being offered for sale to children. We must be constantly on guard against this.

There has been a 25 per cent reduction in blindness from injuries, thanks to the programs of safety education directed to parents and children by both safety councils and prevention of blindness agencies, and to their campaigns to secure state legislation regulating the use of fireworks and air rifles.

Tumors

The group of cases due to tumors must also be mentioned. This group, although still relatively small (3.8 per cent of the total), is increasing. As the cause of cancerous growths in the eyes or brain of young children is not known, it is not yet possible to prevent their occurrence. Moreover, although the early removal of such growth may be expected to save the life of the child, it is often impossible to save his vision.

General Diseases and Poisons

Only a very small percentage of blindness in children is attributed to general diseases (1.2) and to poisonings (0.2). The true figures may be considerably higher. As in the case of prenatal factors in blindness, our knowledge of causal relationships between general systemic diseases and nutritional deficiencies and eye affections is inadequate. Moreover, to establish this relationship definitely in individual cases, it would be necessary to study each child during the period when his eye disease is active. If this were done the chances of saving vision would be greatly increased. This fact alone should stimulate child health and welfare agencies to more effective methods of early case finding.

Site and Type of Eye Affection

In the table in which causes of blindness are shown by site and type of eye affection, it will be noted that cases are classified by part of the eye affected. The largest group is the 36 per cent affecting the eyeball in general. These include the various structural abnormalities of the eye. In the order of their frequency these anomalies are: (1) the eye with several structural defects; (2) the excessively large (buphthalmic) eye, which is the congenital type of glaucoma; (3) the eye of the albino, which lacks pigment; (4) the excessively small or microphthalmic eye; (5) the eye with a cleft, or coloboma, in one or more of its parts; (6) the eye which fails to develop at all (anophthalmos); and, finally, (7) the eye without an iris (aniridia). These defects are often inherited, but may be due to other prenatal factors.

The entire eyeball may be affected also by a general inflammation due to infection or to a serious penetrating injury which may cause degeneration of the eyeball. Refractive errors, if extreme, may cause blindness. This is especially true of the progressive malignant type of myopia (nearsightedness) which is invariably associated with pathological affection of the choroid and retina. The amount of blindness from myopia in the school age group is not large (2.6 per cent of the

total). Fortunately, much of the myopia in school children is not of this serious type. The common type of myopia may tend to increase somewhat during the period of growth, but it finally becomes static while still moderate in degree and can be fully compensated by eyeglasses.

TABLE III. CAUSES OF BLINDNESS, BY SITE AND TYPE OF AFFECTION—SCHOOL YEAR 1947–48*

SITE AND TYPE OF AFFECTION	Per Cent of Total Pupils Enrolled	
Eyeball in General		**36.1**
Structural anomalies	25.3	
(multiple 8.7, buphthalmos 8.7, albinism 2.3, microphthalmos 1.9, coloboma 1.1, anophthalmos 0.6, aniridia 0.5, other and not specified 1.5)		
Refractive errors	3.6	
(myopia 2.6, other and not specified 1.0)		
All other and not specified	7.2	
Cornea		**8.6**
Iris and Ciliary		**5.8**
Crystalline Lens		**17.8**
Cataract	15.6	
Other	2.2	
(retrolental fibroplasia 1.5, dislocated lens 0.7)		
Choroid and Retina		**12.3**
Optic Nerve, Visual Pathway and Cortical Visual Centers		**14.9**
All Other and Not Specified		**4.5**
Total—All Causes		**100.0**

* Based on 3,905 eye examination records of pupils in 39 residential schools and 12 city school systems in 35 states and the District of Columbia.

Blindness involving the crystalline lens accounts for 18 per cent of the total. These are chiefly the cataracts which are prenatal, sometimes hereditary, in origin, but cataracts may also be caused by injury or disease. Dislocated lenses, although much less frequent (less than one per cent), are usually prenatal in origin. The recently identified retrolental fibroplasia is also classified here. The numbers included in the 1947–48 tabulations do not reflect the true frequency, since few of the children known to be affected have reached school age as yet.

Affections of the optic nerve are involved in 15 per cent of the

blindness in school children. They may be present at birth, or due to an infectious disease, chiefly syphilis or meningitis, or to an injury or brain tumor.

Affections of the choroid or retina account for 12 per cent of the total cases. They are largely of prenatal or infectious origin, but the cause in many cases is unknown.

Affections of the iris and ciliary (6 per cent) occur most often in injuries but may also be due to infectious disease or of unknown origin.

The corneal affections (9 per cent) are due chiefly to infections, especially ophthalmia neonatorum and syphilis, but may be due to other causes such as injury.

Services Available to Visually Handicapped Children

In addition to the data on causes of blindness in children, the Committee's studies of eye examination records of braille students have revealed some serious gaps in the services available to visually handicapped children. These should be given careful consideration by the professional groups and agencies which are in a position to do something about them.

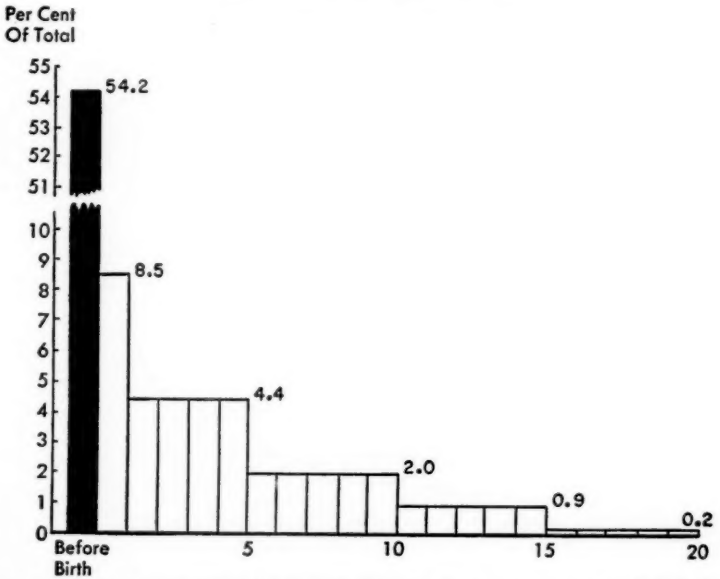
As of 1947–48 seven per cent of the pupils receiving braille instruction had better than 20/200 vision. This does not represent the pupils in the sight-saving classes established in schools for the blind, since the latter group are not included in the study. In Alabama, Arkansas, California, Colorado, Florida, Illinois, Kentucky, Maryland, Oklahoma, Perkins (New England), Tennessee, Washington, West Virginia, and Wisconsin the percentage is above this seven per cent average. These partially seeing pupils, together with many in the borderline group (the 10 per cent with vision of 20/200) who could use their eyes in the process of learning, are being educated as blind children. They usually come from rural and small urban communities where no provisions have been made for special educational facilities for the visually handicapped who are not blind. In accepting them for enrollment the schools for the blind assume a responsibility which they should not undertake unless sight-saving class methods and facilities are available. Moreover, the establishment of sight-saving classes in the schools for the blind is to be discouraged, since institutional care is not required by children having useful vision. The schools for the blind cannot meet all of the educational, vocational, and psychological needs of the partially seeing pupils whom they are able to absorb.* Nor can they offer facilities to the large number of the

* See Hathaway, Winifred: *Education and Health of the Partially Seeing Child.* New York: Columbia University Press, 1947; and Lennon, Elizabeth: "The Partially Seeing Child in a School for the Blind," *Outlook for the Blind and the Teachers Forum,* Vol. 42, No. 2.

partially seeing who require this special type of education.† Instead, state education laws should be amended to provide the special educational materials and specially trained personnel required for an adequate statewide program, as has been done in some states.

Chart No. 3

Age at Onset of Blindness of Blind Children of School Age*



* Based on 3,905 eye examination records of pupils in 39 residential schools and 12 city school systems in 35 states and the District of Columbia.

Another fact disclosed by this study which is of great interest to the schools and to child health and welfare authorities is that the services related to eye care which are made available to visually handicapped children in the infant, preschool, and school age are quite limited. Many of the schools were unable to participate in this study because of inability to obtain an ophthalmological examination for each of their pupils. In the average school for the blind included in this study, each child is given at least one routine ophthalmological examination,

† It is estimated that the respective prevalence rates are approximately: blind—1 in 5,000 of the general school population; partially seeing—1 in 500 to 1,000 of the general school population.

usually sometime during his first year at the school. However, incompleteness of the records indicates that the examination frequently does not include sufficiently intensive study of each case to establish the cause. Moreover, many records show evidence that recommended corrective treatment has not been carried out either before or after the child enters school.

Need for Care From Infancy to Adulthood

These omissions suggest the need for an over-all plan to ensure adequate medical, welfare and educational service to visually handicapped children, both blind and partially seeing, from infancy to maturity, and for delegation to a state agency of responsibility for coordination of services. Such an agency could secure the ophthalmological and other health examinations for the medically indigent child and see that recommendations for corrective treatments are carried out. It could supply competent case-work service to give guidance and interpretation to the parents; to seek facilities for all the child's needs; and to aid the physicians, educators and others in exchange of information and coordination of their services. The medical social workers or public health nurses employed by these agencies might be expected to assume responsibility also for various preventive services. For example, in follow-up of children with blindness due to heredity, syphilis, or trachoma, members of the family or other contacts should be investigated. When workers and parents in any community become aware of the existence of such services they too will refer cases. But the prevention program, to be truly effective, must include special screening procedures for early case finding. Broad cooperative planning would be required, since many of the facilities and services required by these children are not now available, and so must be developed. It is important also that preventive services be made available for all groups in proportion to their need. As the chart shows, the blindness rates for negro children are considerably higher than those for white children, especially blindness due to infectious diseases.

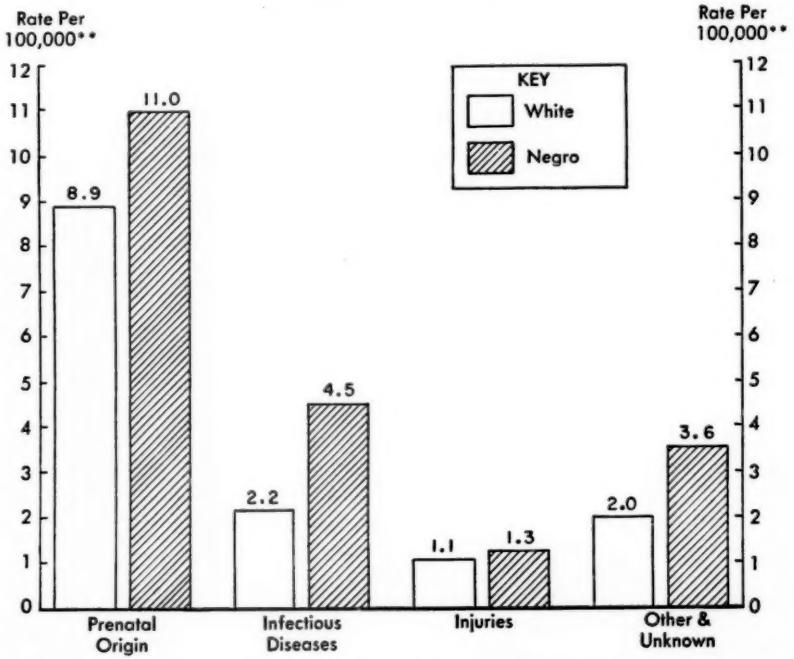
Community Program

Pending development of a coordinated state program, professional groups and agencies can usually undertake many of the needed services for prevention, corrective care, education and social adjustment. Physicians, nurses, social workers, teachers and others, given a knowledge of the problems and of suitable methods for their solution, can usually find ways of expanding their services to meet the needs in

their communities. Starting with exchange of information regarding resources already available in each agency, they can plan to fill the gaps in services. If this is done, the child in need of medical care to prevent blindness will not be neglected until too late because his need

Chart No. 4

Rate of Blindness Among Children Age 5 to 19 Years, by Race and by Cause*



* Based on 3,023 cases in 28 states from which eye records were available for all braille students.

** Rates computed from 1940 census data by race and age.

has not been recognized; the teacher of a partially seeing child will know where to turn for the materials and guidance necessary to provide for education of the child in his own community and as a sighted person rather than as a blind child in an institutional setting; health and safety agencies will guide and assist parents in protecting children from the eye hazards of disease and injury.

Two things are necessary for a good community program: (1) periodic conferences of leaders in each field of activity for cooperative planning and exchange of information; and (2) a series of institutes for the instruction of professional and lay workers.

Summary and Conclusions

Through its studies of the eye examination records of braille students in the United States, the Committee on Statistics of the Blind is producing significant data on the known causes of blindness in children and the extent to which blindness from these causes is being prevented. It has also shown the need for further intensive research on causes of blindness, especially congenital blindness, and for additional services to visually handicapped children.

Continued success in preventing blindness in children is dependent upon three things: (1) more general application of preventive procedures already known; (2) research to increase knowledge of causes and to determine appropriate methods of prevention, and (3) development of preventive facilities adequate to meet the needs. It is hoped that the Committee's findings and recommendations will stimulate action.

Plan for Eye Conservation in Industry

1. Make periodic surveys of work areas for eye hazards.

2. Provide type of protection suitable for the job—goggles, shields, masks, hoods, etc.

3. Provide goggle-adjusting service and encourage employees to keep their goggles in adjustment.

4. Be sure that all those in the work area have goggles, including employees from other departments.

5. Allow no visitors without eye protection.

6. Supervisors should wear goggles for their own protection as well as to set an example to employees.

7. Encourage employees to report foreign bodies in the eye immediately for medical treatment.

8. Make provision for corrective goggles for those who need them.

—From Section on "Personal Protection," the *National Safety News*, March, 1950.

Standards for Sunglasses*

Lt. Comdr. Dean Farnsworth

New London, Conn.

PRESENTS commercial as well as scientific standards, and answers the questions commonly asked about sunglasses.

MOST of us need sunglasses for some periods during our lives, and almost all thinking adults are earnestly trying to choose their optical equipment with care. On one hand they are conscious of the dangers of wearing defective glasses, but, on the other hand, are not in a position to be extravagant in their purchasing. And they rightly doubt whether the payment of a high price will insure the procurement of a good sunglass.

Commercial Standards

When the general vogue for sunglasses reached the astonishing proportions which it did in the past few years, a large number of inferior glasses were rushed into the market by concerns which had no optical knowledge, no experience in optical production, and, sometimes, no conscience. It was largely to protect themselves that a number of established companies, at the instance of The Sun Glass Institute, Inc., initiated the first of the Commercial Standards for sunglasses. These standards were worked out through the routine governmental machinery which is generally available to industry, and were developed under the aegis of the National Bureau of Standards of the Department of Commerce which acts as coordinator, adviser and promulgator of the agreements.

It is important to note that the provisions do not represent the judgment of the Bureau of Standards as to what constitutes a good sunglass; the function of the Bureau is somewhat that of a government mediator who attempts to secure agreement between the interested parties and then to promulgate the agreements in a manner best suited to the public interest.

It should also be recognized that the standards do not represent what the optical companies consider the best eye protection. In the words of the sales manager of one of the largest companies, "My job is to sell quantities of goods. I don't know what people need; I do have to know what

* The assertions contained in this article are the private opinions of the writer and are not to be construed as official or reflecting the views of the Navy Department or the naval service at large.

they will buy." In short, the standards are designed to exclude the poorest quality, but do not necessarily attain high goals of eye protection.

Blown, Drawn and Dropped Lenses

Three commercial standards for sunglasses are now in effect. The first which we will discuss is CS79–40 (or CS79–39) for blown, drawn and dropped lenses. Such lenses can be made by a very cheap manufacturing process and may be assembled into a spectacle of such poor quality that they should not be worn as a general purpose sunglass. The buyer, however, notes a little seal of certification attached which he may interpret to mean that the goggle is approved by the Bureau of Standards. This, of course, is not true. The seal simply indicates that the manufacturer claims to have met certain minimum standards. A sunglass barely passing all of the requirements of CS79–40 may be a very bad sunglass indeed. It may be poor because of properties not covered in the specification (size, fit and ultraviolet and infrared transmission), and it may be unsuited to sunlight conditions because of the liberal maximum light transmittance. These glasses sell for prices ranging from 65 cents to about $8.00, and they do not necessarily indicate range in quality.

Ground and Polished Lenses

Another commercial standard is numbered CS78–40 (also CS78–39) and is for ground and polished lenses —the method used for highest quality optical equipment. The optical tolerance limits in this standard are probably adequate to avoid eyestrain in the wearer. Again, the affixed seal should not be interpreted as implying that the glass is approved by the Bureau of Standards since it only tells the purchaser that the manufacturer claims to have met certain standards of optical properties in certain respects. Such glasses can be bought for $3.00 and up at department stores, drug stores and chain stores.

The institution of these standards may have had some effect in raising the quality of over-the-counter sunglasses. Yet, there are several jokers in the situation. First, since there was no provision for inspection by an independent agency, the word of the manufacturer had to be taken for the claim that the glass conformed to the standards. Second, the standards refer only to the optics and physical properties of the individual glass lenses—all other considerations are ignored. Third, a sunglass which conforms in all respects to the standards may be of good workmanship and without optical flaws, and yet not provide the necessary protection to the user. In brief, a certification says there is nothing very bad about these glasses; it cannot be taken to imply that they provide proper protection. A patent medicine made of tap water may conform to the pure food and drug laws.

Bent Plate Lenses

Recently, a new type of glass was widely introduced which is covered by the third commercial standard, CS159–49. This glass is made by a process in which flat plate glass is ground and polished and then shaped by heat treatment. Of the many sunglasses of this type which have been tested, a large number have been found with pitted surfaces and oxidized surfaces. "Pitting" consists of almost invisible depressions in the

surface. The oxidation film appears as a slightly "frosted" effect. Both of these defects are supposed to be ruled out by commercial standard CS159–49 which states under General Requirements, paragraph 4, that "After curving the lenses shall be free of all visible defects, such as waves, striae, bubbles, and seeds, when examined by transmitted light." Both oxidization and pitting are difficult for an inexperienced layman to detect in a store, but the faults may result in disabling glare under certain light conditions. Commercial standard CS159–49 implies that, if the glasses are taken off and found by visual examination by transmitted light to have no visible defects, then the defects will remain invisible when the glasses are worn under any sunlight condition. This is not true. It is difficult to decide how much of a hazard these defects are likely to be. For beach wear, if practically no visual acuity is required, it is probably not very important. If one did not attempt to read, play games or cross the road, one could probably wear a partially ground glass without much danger to himself or others. However, if such glasses are used for driving, or in any other situation requiring good visual acuity, they could introduce a definite danger.

The surface oxidization in these lenses is so easily remedied by a rouging operation that it is to be hoped the manufacturers using the process will add the additional operation.

Many "pre-ground and polished" manufacturers have joined the program of an organization known as "Safety Standards for Sunglasses, Inc.," which promotes and polices the use of the "20/20" label on lenses which meet their specifications—which are higher than the CS159–49 requirements. These glasses are available in the retail field at 59 cents and up. An independent testing bureau continually samples and inspects at least 5 per cent of each manufacturer's output for conformity to standard. An objection was immediately raised to their advertising seal which included the symbol "20/20" and the words "twenty-twenty" even though their advertising states that the lenses are "eye-protective—not eye corrective." The public might believe that "20/20 sunglasses" would correct defective vision to "normal." Even though the public and indeed many professional persons believe that there is some magic in "20/20," the phrase has no specific value in relation to sunglasses. It must be recognized simply as a trade slogan, along with "9944/100% pure."

As a matter of fact, most of the optometric and ophthalmic practitioners have not had the benefit of training in the subject of sunglasses, and are not always in touch with reliable sources of information. When psychologists at the Medical Research Laboratory, U. S. Naval Submarine Base, did a study of "Standards for General Purpose Sunglasses" medical sources were thoroughly combed and not one piece of research information on general purpose sunglasses was found in medical literature.

A summary of the commercial standards is given in the accompanying table. In most respects it must be admitted that these three standards are not of much help to an individual who attempts to purchase for himself an economical, safe, protective pair of glasses. It would be necessary for him to remember that the label should carry the number CS78–39, CS78–40,

or CS159–49—not CS79–39 or CS79–40. If the number is CS159–49 it will be necessary for him to inspect the glass for surface quality for which he is unlikely to be equipped and qualified. It will be necessary for him to examine the CS78–39 or CS78–40 label carefully to make sure that it does not merely claim to conform to *one section* of the standard. And when all this has been checked, what has he found? Merely the claim that the individual lenses are free from gross optical defects. Some of the most important requirements for good sunglasses are not mentioned in any specifications.

Some additional restrictions have been voluntarily added by the "Safety Standards" group and other manufacturers. Adequate absorption (on the order of 90 per cent) of ultraviolet and infrared energy is guaranteed for most glasses. The Army, Navy, Air Corps, Ship's Stores and the Forestry Service are in a position to set up their own requirements and testing procedures. Thousands of glasses are tested annually by independent and government laboratories—but all this is of no help to the casual purchaser. The present recourse for the ordinary citizen is the conscientious recommendations made by the Consumers Union of the United States, Inc.

Scientists' Recommendations

Many scientists and research laboratories have made extensive in-

TABLE 1: COMPARATIVE TABLE SUMMARIZING COMMERCIAL STANDARDS FOR FINISHED SUNGLASS LENSES

	CS79–40	*CS78–40*	*CS159–49*
	Blown, drawn and dropped lenses	*Ground and polished lenses*	*Ground and polished plate glass thereafter thermally curved*
Prism—not to exceed	¼ prism diopter	⅛ prism diopter	⅛ prism diopter
Focal power—not to exceed	⅛ and ¼ diopter	1/16 diopter	1/16 diopter
Cylinder — difference in focal power in any meridians not to exceed	————*	1/16 diopter	1/16 diopter
Visible Defects — such as seeds, bubbles, striae, waves, flaws	"reasonably free from"	"free from"	"free from"
Surface polish — freedom from grayness	————*	"well polished"	————*
Definition	————*	————*	"resolving power of 24 seconds"
Light Transmission	not over 67%	not over 67%	not over 67%

* a dash indicates no restrictions.

vestigations of eye-protective devices during the past few years, and these experts are in exceptional agreement on the characteristics of what constitutes a good sunglass. The Armed Forces-NRC Vision Committee recently asked a group of these specialists to meet for the purpose of answering specific questions concerning goggles. Without dissent, they agreed on the following facts concerning general-purpose sunglasses:

1. They should be essentially neutral (gray in color) and spectrally non-selective.

2. Colored sunglasses (green, amber, rose, brown) are less satisfactory for general use.

3. Polarizing lenses do not offer much advantage for general wear and the disadvantages may exceed the benefits. They may be desirable for specialized cases involving polarized light from water, highways and encrusted snow.

4. Clip-on lenses may be worn over spectacles but are not a completely satisfactory substitute for a prescription-ground sunglass, because of glare from the periphery.

5. It was agreed that total power distortion should not exceed ⅛ diopter but most members preferred a limit of 1/16 diopter.

6. Transmission of the visible light should be in the region of 10 per cent; 10 per cent or less for use in the air, at sea, on the beach; and more than 10 per cent for driving in town.

An investigation of desirable "Standards for General Purpose Sunglasses," *Color Vision Report No. 17*, was made at the Medical Research Laboratory, U. S. Naval Submarine Base, in 1948. Recommendations included most of the points mentioned above and laid additional emphasis on the following:

1. Matching of lenses.—Right and left lenses should be matched to within ⅕ of the visible transmission. For example, if the transmission of the less-dense lens is 15 per cent, the other should transmit not less than 12 per cent. The danger in unmatched lenses is the 50 per cent chance that they will encourage suppression of the weaker eye.

2. Coverage of the field of view.—Small lenses are cheaper but fail in the very area where glare protection is important—the periphery. For complete comfort it is essential that a sunglass cover substantially the entire field of view. Except for small faces with deep-set eyes and short eyelashes, this demands: (a) large lenses (#5 or #6 on the New London Scale); (b) lenses of 6 base curve; and (c) frames that permit close fitting to the face.

So-called "flying" or "airforce" types have large, 6 base curve lenses and are "naturals" for flat faces, but the construction of the frame does not permit easy manipulation of the bridge for fitting to oval heads. An optician can easily heat and bend the frame of a plastic spectacle to fit the wearer's face. The hinged bridge of the Forestry Service spectacle can sometimes be found in so-called "Sportsman's glasses." European sunglasses are made in several sizes (designated by interpupillary distance) from which the wearer can select the size and shape which best fits his face. In place of the uniformly narrow (or irregular decorative) rim found in American glasses, many European models have face-contoured plastic frames. It may be that in time the

United States manufacturers will turn from rhinestones to utility, or even that the tariffs will be lowered to permit the American public a wider choice of eye-protective equipment.

Since 1947 we have been pleading with the industry to use educational advertising and informative labeling of the product. The minimum requirements are clear:

1. Essential neutrality.
2. Power distortions of not over 1/16 diopter (measured "as worn").
3. Matched lenses (to better than 20 per cent).
4. Light transmission, not over 25 per cent (6–12 per cent and 12–25 per cent).
5. Transmission of ultraviolet and infrared, less than that of the visible.
6. Surfaces polished, without flaws.
7. Size of lens, not less than #5 (New London Scale).
8. Curvature of lens, not less than 4 base (6 preferred, unless compensated for under item 9).
9. Frames designed for a variety of interpupillary distances and face shapes, or adjustable to face shape, so as to give peripheral protection.
10. Glass lenses when fitted in the frames showing no internal strain.

The major optical companies are prepared today to furnish such glasses when the professions and the public demand them.

Common Questions About Sunglasses

Q. Most sunglasses have high transmission for light. Are these of any value?

A. Yes. (1) They help to keep dust out of the eyes and protect sensitive conjunctiva from windburn; (2) 30–50 per cent transmissions (the most common) provide a slight relief from glare; (3) sunglasses provide a measure of confidence by permitting a psychic withdrawal from personal contacts to those seeking privacy in public; (4) they provide an added note of decoration in addition to belt buckles, scatter pins and earrings.

Q. The public has shown a preference for high transmissions of the order of 30 or 40 per cent. Therefore, are these not better?

A. All controlled researches thus far have shown preferences ranging from 3 to 20 per cent—none higher. Most purchases are made in stores and offices lighted by 10 to 30 footcandles. When the selections are made on the snow, the seashore or the highway (2,000 to 10,000 footcandles), the densest glasses now commercially available have been found insufficient by the wearers.

Q. Some advertisers claim that their sunglasses will sharpen vision in mist and fog, eliminate headlight glare, increase the amount of visible light, give complete eye protection, and so on. Can these things be true?

A. Spinach. The most that a general-purpose sunglass can do is to give some eye comfort to some people, sometimes.

Q. I need correction for distant vision and wear sunglasses a good deal. Should I have specially ground sunglasses?

A. Definitely. This is where the ophthalmologist or optometrist comes in. He should make sure that the most

absorbent glass available is used, because the grinding will reduce the final density. Extreme "plus" or cylindrical corrections should not be made with ordinary glass. Types of glass available for such prescriptions are fused, metallic coated, and laminated.

Q. If I am wearing a good sunglass can I safely look at the sun during eclipses or when I'm just lying on the beach?

A. Heavens, no!! We gave Navy Crosses to lookouts who blinded themselves by looking close to the sun to warn of Kamikaze attacks, but all *you'll* get will be blindspots in your vision which will never go away. Partial or central blindness is the penalty for such curiosity. Consider that the brightness of the brightest sandbeach is 10,000 footlamberts. The brightness of the disc of the sun *after reduction* by a 10 per cent glass is about 50,000,000 footlamberts! Yes, fifty million! That will burn any retina in a short time.

Q. Are there sunglasses which will eliminate headlight glare?

A. Definitely not. Sunglasses must never be worn when driving at night or in twilight. Any glass which reduces the brightness of oncoming headlights will blot out the fainter roadside cues upon which you depend for holding to the road—upon which you depend for safety and life. If you need correction for distance be sure to put on your regular spectacles before sunset. And keep the surfaces very clean.

Q. Are sunglasses helpful for viewing television?

A. Not necessarily. However, anything that helps a television program should be commended. If the brightness of your set is above flicker fusion, you can (a) reduce the brightness of the signal or (b) wear goggles. Adjustment of the room illumination may help but individual differences must be expected with respect to critical flicker frequency.

Q. Does everyone need sunglasses when out-of-doors?

A. No. It depends upon the circumstances and on you. If you squint, furrow your brow, constrict the muscles of the eyelids, and end the day with tired, teary or inflamed eyes—sunglasses may help. But nature provides some people with filters in the ocular and macular media which are ten or twenty times the density that others are born with. The differences among individuals are greater than the density of the darkest glass on the market.

Sunglasses may be needed for special occasions only. A New Englander is likely to need them for his vacation in Bermuda. Indoor workers who go to the beach only on Sundays will benefit from good sunglasses then. A week end of skiing in the sunshine may unduly expose the conjunctiva to ultraviolet. Desert highways may be intolerable to the driver because of heat radiation. Once the eyes have been conditioned to the protection of sunglasses they must be worn regularly when exposed to glare, or discontinued gradually.

Even if the symptoms of strain are not evident it may be that sunglasses make your out-of-doors activities more comfortable and pleasant—but make sure that this margin of comfort is achieved with safety.

Vision Testing of School Children*

Richard G. Scobee, M.D.

St. Louis, Missouri

THIS is a preliminary report of a study carried out with the joint support of the National Society for the Prevention of Blindness, the Children's Bureau of the Federal Security Agency, the Division of Health of the State of Missouri, the St. Louis Board of Education, and the Office of Naval Research.

THE average school child rarely complains about his eyes. Therefore, when ocular complaints are made *spontaneously* by the child, they usually are bona fide. It has been estimated that 80 to 85 per cent of our sensations from the world in which we live reach us via the eyes. If this is true, and if the victim of an ocular defect fails to complain about the situation and thus bring it to the attention of some responsible person, then we should expect to find such a school child, for example, being gradually shut off from the world in which he lives. This, as a matter of fact, actually happens all too frequently. A child, seeing only part of the world around him, may be accused by his teachers of stupidity, inattention, or being a behavior problem. The defense mechanisms raised by the child to such accusations are almost legion and practically none of them are good, at least from the viewpoint of teacher and parent.

If the child does not come to us with complaints except in isolated instances, then it is the duty of those who work with the child and of those who live with him to go to him. His visual mechanism should be examined carefully in order to be sure that he can compete successfully in a highly competitive world. Studies of a cross section of the child population in any school system will reveal the incidence of various ocular defects and thus give some indication of what we may expect to find in children in general.

Scope of the Study

A study of a sampling of children in the public schools of the city of St. Louis has been completed recently. Clinical examinations of the binocular

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mechanism were made at the Washington University School of Medicine. Complete data are available for 1,215 children, of which, 609 were in the sixth grade and the remaining 606 were in the first grade. Practically all of the children in the first and sixth grades of several schools were examined; the few exceptions (children not examined) were those whose parents had refused permission for the examination. The entire clinical examination was conducted by three ophthalmologists, each performing the same one third of the whole examination upon every child. Before turning to a consideration of the actual findings, a word of discussion is in order about the criteria for the significance of the findings in general.

In the examination of the visual apparatus of the school child, the reasons for referral for further attention will depend in part upon the ophthalmologic skill and experience of the examiner. The home-room teacher, cast in the rôle of examiner, would be likely to select for further attention only those children with the more obvious defects and she might at the same time erroneously refer some children with no defects at all, acting largely upon a basis of her own impressions plus her knowledge of the behavior of past pupils who were found to have ocular defects.

The school nurse, having had some training in medicine and allied subjects, would undoubtedly select more children who actually needed ocular attention, and she would be likely to select fewer who seemed to need attention but in fact did not.

The ophthalmologist is in the best position to evaluate the visual mechanism of each child. He is in a position to state that the headaches of one child are probably the result of eyestrain while those of another are not. The ophthalmologist is in a position to say which children do need actual attention and which do not.

For the purposes of this study, the project director attempted to place himself, first, in the position of the school physician, and, second, in that of the ophthalmologist in passing judgment on which children should be "referred" for eye care. In every child, referral was considered indicated if there were either subjective or objective findings potentially associated with the visual mechanism. For example, a child complaining of "headaches," or of "blurred vision," even though visual acuity was normal in each eye, would be "referred." Unequal visual acuity in the two eyes is associated with significant refractive error sufficiently often to make such a finding at least a debatable cause for referral.

Following a complete ophthalmologic examination, it was possible to evaluate properly the "referral" cases, and they were then divided into two categories. Where examination revealed a definite need of eye care—usually in the form of glasses—the case was called an "actual referral." Where examination revealed no significant cause for the referral findings, the case was called a "theoretical referral." As an example of the latter type, a child might have a visual acuity of 20/25 in one eye and 20/20 in the other and have been referred; examination would reveal no significant refractive error and, subsequently, 20/20 visual acuity in each eye. Since a school physician would have no way of determining whether

or not the unequal visual acuity was due to anisometropia (a difference of the refraction in the two eyes), the case was referred. Ophthalmologic examination indicated no actual need of corrective measures, however, and the case was therefore considered a "theoretical referral." The analysis of data to be reported will be in terms of theoretical and actual referrals.

Of the sample of 1,215 children, 316 were "actual referrals," that is, children in definite need of help with respect to their eyes. This represents 26 per cent. An additional 249 children were found to be "theoretical referrals," that is, children who had to be considered in need of eye care, subject to a detailed ophthalmologic examination which proved that such was not the case. A total of 565, or 46.5 per cent of the children appeared to need eye care. This figure seems alarmingly high, perhaps, until one remembers that *the criteria for referral were unusually strict* in order that no child needing eye care even slightly would be missed.

Subjective Symptoms

How significant are the complaints of children which might be attributed to eyestrain? Of a total of 565 referrals, 88, or 15.6 per cent, were due to symptoms alone, the visual acuity being normal. The symptoms included headaches, burning of the eyes, drowsiness upon attempting close work, blurring of vision, inability to see the blackboard, or discomfort when watching moving objects (panoramic symptoms). Of these 88 children, 25 or 28.4 per cent, were found to have a bona fide cause for their complaints. The remaining 63 (71.6 per cent) were needlessly referred.

Of the 25 who actually needed help, 17 complained of headaches and were found to be farsighted or had farsighted astigmatism or both; 2 complained of "blurring" although their visual acuity was normal; 1 said she "couldn't see the blackboard" although her visual acuity was normal; and 5 with normal visual acuity had headaches and nearsighted astigmatism.

Generally speaking about 3 out of 10 children with normal visual acuity, who, *upon questioning*, have subjective complaints usually associated with eyestrain, will actually be in need of help; the remaining 7 will be found to have some other cause for their symptoms, if the symptoms do actually exist. It is obvious that asking a child whether he or she has specific symptoms is a poor method indeed. Children are too suggestible, too willing and anxious to please, too ready to say what they think is desired. On the other hand, I have never yet seen a child who *volunteered* that he had a headache and who had no rather easily discoverable cause for it. Certainly the same cannot be said of adults.

Subnormal Visual Acuity Plus Symptoms

One hundred and four children apparently had subnormal visual acuity in one or both eyes and complained of one or more of the symptoms usually associated with eyestrain. Of these, 60 were actually in need of help in the form of glasses, while the remaining 44 had no significant refractive error, subsequently were found to have normal visual acuity, and had no apparent basis for their symptoms.

Of the 60 who actually needed help, 25 had either farsightedness, farsighted astigmatism, or both; and 35 had either nearsightedness, nearsighted astigmatism, or both. The 25 children in the farsighted group uniformly complained of headaches following use of the eyes for close work. Of the 35 children in the nearsighted group, 21 complained only of headache; 12 said they "couldn't see the blackboard" or that "things looked blurred"; 1 became drowsy upon using the eyes for close work; and 1 complained of nausea and/or headache when looking out the windows of moving trains, buses, or streetcars.

The 44 children who were needlessly referred because of symptoms plus apparently subnormal visual acuity gave "headache" as the commonest complaint.

Generally speaking, about 60 per cent of children who appear to have subnormal visual acuity in one or both eyes and who complain of symptoms usually associated with eyestrain will be actually in need of help. The remaining 40 per cent will be needlessly referred with the same criterion. Of the total of 565 referrals 18.4 per cent were due to a combination of subnormal visual acuity and symptoms of eyestrain.

Subnormal Visual Acuity Alone

A visual acuity of 20/30 is generally considered as being normal for a child in the first grade, although it is not at all uncommon to find children in the first grade with a visual acuity of 20/20 in each eye. For the sixth grade child, a visual acuity of 20/20 or better should be obtained to be considered normal and anything less may usually be labeled subnormal. Visual acuity of less than 20/30 in first grade children and of less than 20/20 in sixth grade children was considered subnormal in this study, and thus a reason for referral.

One hundred and nine children were found to have only subnormal visual acuity and to be in need of help in the form of glasses. Of these, 66 were either farsighted, had farsighted astigmatism, or both; 43 were either nearsighted, had nearsighted astigmatism, or both. Thus 34.5 per cent of the 316 actual referrals were because of subnormal visual acuity.

Upon careful examination for glasses, 69 children who appeared to have subnormal visual acuity were found to have an insignificant refractive error and to have normal visual acuity on a subsequent examination.

Of the total of 565 referrals, 178 children or 31.5 per cent were referred because of subnormal visual acuity in one or both eyes; and 109 (61.2 per cent) of the 178 were actually in need of help in the form of glasses, while the remaining 69 (38.8 per cent) would have been needlessly referred.

It is probably a safe generalization to say that two thirds of all children referred solely because of apparently subnormal visual acuity in one or both eyes as measured on a Snellen chart will be in need of help, and one third will be needlessly referred.

Unequal but Normal Visual Acuity

The question of whether unequal visual acuity in the two eyes is a suitable criterion for referral merits some consideration. A child in the first grade may be considered to have "normal" visual acuity if his measurements are 20/30, 20/25, or 20/20, in each eye. A child in the sixth grade is

considered as having "normal" visual acuity if his measurements are 20/20, 20/15, or, as occasionally is found, 20/10, in each eye. The average sixth grade child can read smaller Snellen letters than can the average first grade child.

In this study, there were 132 actual referrals on the basis of visual acuity alone, of whom 109 had subnormal visual acuity in one or both eyes. That is to say, 109 children had visual acuity of less than 20/30 in one or both eyes if they were in the first grade or less than 20/20, if in the sixth grade. We have just explained that 20/30 was considered "normal" for the first grade, while 20/20 was "normal" for the sixth grade. The rest of the group—23 children—was composed of 21 first graders and 2 sixth graders who had *unequal* visual acuity in the two eyes, even though their visual acuity measurements came within so-called "normal" limits. Thus a first grade child might have 20/20 in one eye and 20/30 in the other; this is unequal visual acuity but if 20/30 is taken as "normal" for the first grade, then this child might be said to have normal vision. Twenty-one first graders were referred by this criterion of unequal but "normal" visual acuity who were definitely in need of attention and who had absolutely no other presenting sign or symptom. The same was true of 2 sixth graders who had 20/20 in one eye and 20/15 in the other, who might thus be considered as having "normal" visual acuity, and yet were in definite need of attention.

The question of the possible validity of such a criterion as unequal but "normal" visual acuity as an indication for referral can perhaps be answered in part by turning to a consideration of the theoretical referrals resulting from this cause. Forty-six children were considered theoretical referrals on the basis of "normal" but unequal visual acuity in the two eyes —42 in the first grade and 4 in the sixth grade. As it turned out following careful examination, there was no apparent reason for the difference in visual acuity in the two eyes of the children in this group, and everyone, after refraction, was found to have not only insignificant refractive errors but *equal* visual acuity in the two eyes.

One finds, then, a total of 69 children coming under suspicion because of "normal" but unequal visual acuity in the two eyes. Of these, 23 needed glasses and 46 did not need them. Two thirds of the 69 would thus have been needlessly referred to an ophthalmologist by the school physician employing the criterion of unequal but "normal" visual acuity.

Can we afford to miss the remaining one third? Ideally, of course, the answer is no. Practically, it may be yes. The 69 children represent 12.2 per cent of the total referrals—theoretical and actual—numbering 565. Looking at it another way, the 23 who actually needed help represent approximately 7 per cent of the 316 actual referrals, or 2 per cent of the entire sample of 1,215 children.

All of the children referred on the basis of unequal but "normal" visual acuity were farsighted. It is true that the child is in a much better position than the adult to compensate for farsightedness by excessive accommodation and can do so without any harm to the eyes unless a predisposition toward esotropia is present and the child's eyes cross as a result. This latter possibility, when it occurs,

usually takes place at the age of 2½ to 3 years, and less than 5 per cent of all tropias occur at age six or thereafter. The child, by the time he reaches the first grade, has 95 chances in 100 that his eyes will remain straight. Thus there is little possibility of harm from compensating for undetected farsightedness of a significant amount.

Considering all of the facts, it appears that unequal but "normal" visual acuity in the two eyes is not a suitable criterion for referral because too many children would be needlessly referred, and apparently little harm is done in the case of children not referred but actually needing attention. It may also be added that unequal but "normal" visual acuity in the two eyes is far more significant in sixth grade children than in first grade children, because unequal but normal acuity is more likely to have some significant cause in the older children.

Muscle Imbalance

The two eyes must work together comfortably as a team if the binocular mechanism is to be considered normal. If the eyes are working together but with definite effort, a significant heterophoria is present. If they are not working together at all but the child uses one or the other eye and never both together, heterotropia is present. Heterophoria and heterotropia are forms of muscle imbalance. Heterotropia is a gross or manifest deviation of the eyes which occurs when fusion is lacking. Heterophoria is a deviation which is prevented from occurring by the fusion mechanism. If heterophoria is great, definite effort must be expended by the fusion mechanism to prevent a deviation. Heterophoria lapses into heterotropia when the strain upon the fusion mechanism becomes excessive.

In the study, 53 children had muscle imbalances which were significant in amount, representing 16.7 per cent of the 316 actual referrals. Of the 53, 18 had esotropia, 6 had exotropia, 7 had esophoria, 17 had exophoria, 4 had hyperphoria, and 1 had poor prism divergence.

What can be considered the limits of so-called normal heterophoria for school children in the first and sixth grades? In one study* 95 per cent of young, healthy, adult males aged 18–35 fell between 5 prism diopters of esophoria and 4 prism diopters of exophoria at a distance of 20 feet, using the Maddox rod test. Of the same group 85 per cent fell between 10 prism diopters of exophoria and 4 prism diopters of esophoria, at 13 inches. The same study revealed a very slight but nevertheless statistically significant relationship between age and heterophoria. One must therefore be cautious in attempting to apply normal limits for heterophoria determined on a sample of one age group to a sample of much younger subjects. The limits determined in the previous study* were arbitrarily but tentatively used in the present study because the testing techniques were identical for the two studies and the same examiner did all the work in both.

At a later date, when the distribution for heterophoria has been determined for the entire sample of

* Scobee, R. G., M.D., and Green, E. L., Ph.D., "Relationships Between Lateral Heterophoria, Prism Vergence, and the Near Point of Convergence." *American Journal of Ophthalmology*, Vol. 31, No. 4, April, 1948, pp. 427–441.

1,215 school children, it will be possible to select "normal" limits for the sample in this study. Until that time, the criterion for referral will arbitrarily be those limits determined for the older group.

Of 22 children having muscle imbalances which would have to be considered suspicious, and thus a cause for referral, from the standpoint of the amount of imbalance alone, 5 had esophoria, 7 had exophoria, and 10 had hyperphoria. Mere knowledge of the amount of heterophoria alone is not sufficient to allow any conclusion about whether or not the heterophoria is significant. The reserve power of the fusion mechanism also had to be investigated. When this was done, all of the 22 children were found to have sufficient fusional reserve to enable them to handle their heterophoria successfully without help. These 22 children were thus listed as theoretical referrals. The previously mentioned group of 53 children did have a significant imbalance.

The total number of children referred because of muscle imbalance was 75, of whom 22 (29 per cent) would have been needlessly referred on a basis of the measurement of the muscle imbalance alone, in the absence of further detailed investigation of the binocular mechanism. Generally speaking, about 7 out of 10 children who have apparently excessive amounts of heterophoria or have heterotropia will require treatment, while the remaining 3 will not.

Refractive Error Alone

Of the 316 actual referrals, 34 children (10.7 per cent) had normal visual acuity, no subjective complaints associated with the eyes, and had a normal muscle balance, yet they needed glasses.

Thirteen children were significantly farsighted, had farsighted astigmatism, or both; and 17 had a low-grade myopia (nearsightedness) which could be expected to increase to a significant level with the passage of time and which probably should be corrected whenever found. The only way in which these 30 children could be discovered would be by cycloplegic refraction, because in all other respects their eyes appeared to be normal at the time of examination.

There is still no general agreement among ophthalmologists on the problem of what to do with the child with incipient myopia. It is probable that a majority are of the opinion that any amount of myopia in a child should be corrected with glasses. A minority favor delaying any prescription of correcting lenses until visual acuity falls below normal levels. The question of whether or not the wearing of glasses by the nearsighted child curbs the rate and/or amount of increase of the nearsightedness is still a moot one. Acting upon the theory that probably it is better to be safe than sorry, the children with low-grade nearsightedness were considered as being in need of help in the form of glasses.

One child with normal visual acuity was found wearing glasses and his glasses were far from correct.

Three children wearing glasses for nearsightedness had normal vision, no symptoms, and were definitely farsighted!

Two children had significant anisometropia (unequal refractive error in the two eyes) but had normal vision and no symptoms.

Ocular Inflammation

Eight of the sample of 1,215 children (0.1 per cent) were found to have inflammatory conditions of the eyes demanding attention; 4 had conjunctivitis or pink eye, 3 of whom complained of blurred vision because of excessive secretion; 2 had a Meibomian abscess on one lid; 1 had severe squamous blepharitis; and 1 had episcleritis.

One child having a very mild conjunctivitis had normal visual acuity but complained of blurred vision. The condition present was not considered significant enough to demand treatment and the case was therefore listed as one of theoretical referral.

Miscellaneous Causes for Referral

Four children were found to have ocular conditions which have not been mentioned previously suggesting referral. One child had a shrunken, sightless eyeball which should be removed and replaced with a prosthesis. 1 child had nits (lice) in her eyelashes but none were found elsewhere on the head or body. 1 child had a congenital cataract in one eye which should be removed. 1 child had papilledema (choked disc) in one eye, a finding indicative of increased intracranial pressure, which calls for thorough neurological investigation. These seven cases were considered actual referrals.

Two children were considered theoretical referrals: 1 had a bilateral partial ptosis (drooping of the upper eyelids) which interfered partially with good visual acuity; and 1 child had an easily removed small cinder on the cornea of the eyeball.

Six children were referred for miscellaneous causes: 4 were actual referrals and 2 were theoretical ones.

Children's Complaints

The clinician is usually interested in the frequency of various complaints attributable to refractive errors and the data from this study provide some information about the complaints of children. Of the 316 children from the first and sixth grades who were in need of ocular care, 246 had a significant refractive error: 146 were farsighted and 100 were nearsighted.

The farsighted group is composed of hypermetropia, hypermetropic astigmatism, and compound hypermetropic astigmatism. Of the children with significant refractive errors, 59.3 per cent fell in this group; the remaining 40.7 per cent had myopia, myopic astigmatism, compound myopic astigmatism, or mixed astigmatism.

Farsighted Group

Of the 146 children in the farsighted group, 64 (43.2 per cent) had subnormal visual acuity in one or both eyes; 25 (17.1 per cent) had subnormal visual acuity in one or both eyes and also complained of headaches; 23 (15.7 per cent) had unequal visual acuity in the two eyes although the visual acuity in both eyes was within the limits of normal for their age group; 17 (11.6 per cent) complained only of headaches and had normal visual acuity; 13 (8.9 per cent) had normal visual acuity, had no symptoms at all, and yet were significantly farsighted (usually more than three diopters). Two children complained of "blurring" of vision but their visual acuity was normal. One child said that he "couldn't see the blackboard" but had normal visual acuity, and one child was wearing incorrect glasses but not complaining, and had normal visual acuity.

The two most common findings in the significantly farsighted group were subnormal visual acuity in one or both eyes (43.2 per cent) and subnormal acuity plus headaches (17.1 per cent). Interestingly enough, normal but unequal visual acuity in the two eyes was the third commonest finding, being present in 15.7 per cent of the farsighted group. Headaches alone with normal visual acuity were found in only 11.6 per cent. Only 14 out of 146 children had normal visual acuity, no symptoms, and had to be examined specifically for refractive error to uncover any defect.

Nearsighted Group

Passing next to a consideration of the nearsighted group, since it numbered an even 100, the figures also represent percentages. Subnormal visual acuity in one or both eyes was the most frequent finding, being present in 43 per cent; it is interesting that 43.2 per cent of the farsighted group had the same finding. Also, as in the farsighted group, next in order of frequency in nearsightedness, came 21 per cent with subnormal visual acuity in one or both eyes, plus headaches; 17 per cent had normal visual acuity, no complaints, but had incipient myopia; 12 per cent complained either of "blurred vision" or that they "couldn't see the blackboard" and were found to have subnormal visual acuity. The 43 per cent with subnormal visual acuity and no complaints were unaware that their vision was in any way defective. Five per cent complained of headaches but had normal visual acuity. One child had panoramic symptoms, and another became drowsy upon attempting close work.

The frequency of headache with or without other findings in the nearsighted group was 26 per cent, as compared with 28.7 per cent for the farsighted group. This came as a surprise, at least to the writer, who had been under the impression that headaches were much more commonly found in association with hypermetropia than with myopia. In the sample for this study, at least, the frequency of headaches was about the same in the two groups.

Significance of Findings Suggesting Refractive Error

In the group of theoretical referrals, 222 children of 249 (89 per cent) were referred because of findings suggestive of a significant refractive error, i.e., apparently subnormal visual acuity; apparently unequal but normal visual acuity; and subjective symptoms with or without apparently subnormal visual acuity. The entire 222 had to be examined specifically for the presence of a refractive error in order to rule it out as a possibility. In the actual referrals, 246 out of 316 (77.8 per cent) had to be examined because of the same findings. One may conclude, since the percentages are similar for both groups, that not quite half of the children who appear to have significant refractive errors upon screening examinations will actually be found to have them when complete examinations are carried out. This may be considered a somewhat discouraging finding by those favoring the screening examination since, at least from the standpoint of refractive errors, more than 50 per cent of referrals made upon very strict criteria will be needless ones. If, however, one relied upon the child to complain, only 85 (26.9

per cent) of the 316 actually needing attention would have been found and then only after careful questioning. Of the 249 theoretical referrals 107 had subjective complaints.

In conclusion, about three fourths of all children in actual need of eye care will never get it if we wait for the child to complain. It is obvious that the child will not come to us and that we must go to him. Even the most carefully conducted screening examinations by the school physician, using rather rigid criteria, will result in slightly more than 50 per cent of needless referrals. Such rigid criteria are necessary, however, if we are to reach every single child who actually needs attention. From the standpoint of the child's eyes and their importance in his life, it is perhaps not being too emotional to conclude that despite needless referrals, it is far better to err on the side of being safe than sorry.

RESULTS OF COMPLETE EYE EXAMINATIONS ON 1,215 CHILDREN IN THE ST. LOUIS PUBLIC SCHOOL SYSTEM

Reason for Referral—	*Actual*	*Theoretical*	*Total*
Asthenopic symptoms only	25 (2.0)*	63 (5.2)	88 (7.2)
Asthenopic symptoms plus subnormal visual acuity	60 (5.0)	44 (3.5)	104 (8.6)
Subnormal visual acuity	109 (8.9)	69 (5.7)	178 (14.6)
Unequal normal visual acuity	23 (1.9)	46 (3.8)	69 (5.7)
Heterophoria and Heterotropia	53 (4.4)	22 (1.8)	75 (6.2)
Refractive error	34 (2.7)	2 (0.2)	36 (2.9)
Ocular inflammation	8 (0.6)	1 (0.1)	9 (0.7)
Miscellaneous	4 (0.3)	2 (0.2)	6 (0.5)
TOTAL	316 (25.8)	249 (20.6)	565 (46.4)

* Figures in parentheses are percentages of the total sample of 1,215.

Summary

Complete ophthalmologic examinations were performed upon 1,215 children of the St. Louis public schools: 609 from the sixth grade and 606 from the first grade. Those children about whose visual mechanism the slightest suspicion was raised by a preliminary type of clinical examination were considered as "referrals." There were 565 such "referrals," representing 46.5 per cent of the 1,215. Such a figure seems alarmingly high until the unusually strict criteria for "referral" are emphasized. These included any subjective complaints which might possibly be associated with the visual mechanism: unequal but "normal" visual acuity in the two eyes; apparently subnormal visual acuity in one or both eyes; any heterophoria greater than 5 prism diopters of esophoria or 4 prism diopters of exophoria at far, and greater than 4 prism diopters of esophoria or 10 prism diopters of exophoria at near; any heterotropia, more than 3 diopters of hypermetropia; any myopia or myopic astigmatism; any ocular inflammation; and any ocular condition which might be improved cosmetically by therapy (such as ptosis, a shrunken eyeball).

The 565 "referrals" were further subdivided into two groups: (1) *actual* referrals, of which there were 316 (or 26 per cent of 1,215) who actually needed ocular care; and (2) *theoretical* referrals, of which there were 249 (20 per cent) who had to be referred on the basis of very strict referral criteria and yet, upon careful examination, needed no help and might thus be considered needless referrals.

The least accurate criteria of those used for referral were subjective complaints, and unequal but normal visual acuity in the two eyes. The most accurate criteria (giving fewer needless referrals) were muscle imbalances and subnormal visual acuity in one or both eyes.

There is a vast difference between asking a child whether headaches are present and having a child volunteer spontaneously that he has headaches. Symptoms elicited by quizzing are likely to be misleading 72 per cent of the time, because children are subject to suggestion and because they are anxious to please and to say what they think is wanted. Spontaneously volunteered symptoms from a child, on the other hand, are usually bona fide and indicative of a need for attention at once.

Visual acuity testing is an art, particularly in children, and even the most skilled examiner may occasionally require a second or even a third test to determine whether visual acuity is actually "normal." About half of all children who appear to have subnormal visual acuity on the original examination will be found to have perfectly normal acuity on subsequent examinations.

The average school child who is in need of ocular attention seldom presents himself for help. We must instead search for him. Any good type of screening examination will pick out a majority of those in need of help, but it will also single out a large number who do not need help, and there seems to be no way around this dilemma which exists because of the psychology of the child. Ideally, it is obvious that every school child should have a complete ophthalmologic examination. If only screening examinations are done, generally speaking, we must be prepared to examine completely *two* children to find *one* who really needs help.

It is to be emphasized that the criteria for referral used in this study are *not* recommended at this time for general school use. Subsequent reports will contain suggested criteria based upon distribution curves and other data from the study.

Syphilis and Blindness*

Joseph V. Klauder, M.D.†

and

George P. Meyer, M.D.

Philadelphia, Pennsylvania

POINTS out the urgency of more interest in syphilis as a systemic disease, in its public health aspects, its treatment, and in early diagnosis of optic nerve treatment.

STATISTICAL studies of the causes of blindness attribute 10 to 15 per cent to syphilis.[1] Hurlin[2] estimated the rate of blindness per 1,000 of population in the United States as 1.7. He concluded that about 230,000 was a reasonable estimate of total number of blind persons in the United States in 1940. On the basis of these figures it can be deduced that there are 23,000 to 34,500 syphilitic blind in the United States.

The outstanding causes of blindness of syphilitic origin are primary atrophy of the optic nerve of acquired and of congenital syphilis and interstitial keratitis of congenital syphilis. Other less common ocular syphilitic lesions that may result in blindness were discussed elsewhere[3] and will not now be considered.

In 1932 Moore[4] estimated that there must be 50,000 cases of primary atrophy of the optic nerve (of acquired syphilis) in the United States. This figure was based on an estimate of 423,000 new cases of syphilis each year, the census figures, and the estimate that 10 per cent of the adult population is infected with syphilis. Of untreated or poorly treated syphilitics, approximately 5 per cent develop tabes. There are about one half million persons with tabes in the United States and 10 to 15 per cent of these may be expected to develop optic nerve atrophy.

Since Moore's estimate the census has shown an increase. On the other hand the incidence of new cases of syphilis has decreased. The estimate

* From the Ocular Syphilis Clinic, Wills Eye Hospital, Philadelphia, and the Division of Venereal Disease Control, Department of Public Health of Philadelphia.

† Senior Consultant, Division of Venereal Disease Control, Department of Public Health, Philadelphia.

for 1947 in the United States is 250,000.[5] According to Dr. Walter J. Clarke, American Social Hygiene Association (personal communication), the estimated annual incidence of new cases, which prior to 1936 was 500,000, had been reduced to approximately 220,000 by 1945. Since the end of the war the incidence appears to have risen to about 250,000 cases each year.

Primary Syphilitic Atrophy of the Optic Nerve

Acquired Syphilis

Syphilitic primary* atrophy of the optic nerve of acquired syphilis is associated with neurosyphilis. It therefore occurs with the different types of neurosyphilis, especially the tabetic type.

A study[3] of 377 patients with optic nerve involvement revealed that of this number 20 had congenital syphilis; in the remainder the infection was acquired. Males, both white and Negro, were more affected than females, in a ratio of 3.5 to 1. The youngest was 24, the oldest was 80. The predominating decade when first seen (for reason of impaired vision) was 40 to 50.

An unfortunate observation in our study, which we wish to stress, is that 61 per cent of our 377 patients with acquired syphilis when first seen were either industrially blind, 6/60 (20/200) in the better eye (the upper limit for industrial blindness), or had visual acuity of less than 1/60 (3/200). Only 11.3 per cent had visual acuity of 6/9–6/6 (20/30–20/20); and in only 13.3 per cent it was 6/12–6/15 (20/40–20/50).

In Lehrfeld and Gross's[6] study of optic atrophy of patients attending Wills Eye Hospital in Philadelphia, it was determined that of 338 patients there was a history of a chancre in 26 per cent and in 14 per cent a history of having had gonorrhea. The remaining 60 per cent had no knowledge of infection. The patients in this series received either grossly inadequate or no treatment in the early stage of their infection. Of patients who had knowledge of infection there was an average interval of 18 years between infection and onset of loss of vision, and an average of 18 months between onset of loss of vision and institution of what might be regarded as proper treatment of optic atrophy.

An important observation of Lehrfeld and Gross was that 31 per cent of their patients at the onset of impaired visual acuity consulted an optometrist as an initial means of treatment. Some visited the same or a different optometrist for as long a period as two years. It was exceptional that the optometrist referred the patient to the proper place for study. Other patients stated that as an initial step in treatment they consulted an "eye doctor"; when further questioned, however, they said the "eye doctor" had a store and dispensed glasses. The majority of clinic clientele did not know the difference between an optometrist and an oculist or ophthalmologist.

In a considerable percentage of our patients the underlying neurosyphilis pursued a silent course, so far as subjective symptoms were concerned. Frequently impaired visual acuity was

* The word "primary" indicates that the atrophy is the initial process affecting the nerve, whereas in secondary atrophy, some preceding eye disorder induced a resultant atrophy.

the first and only symptom that motivated the patient to seek medical consultation and was therefore the first symptom that led to the diagnosis of the underlying infection.

Atrophy of the optic nerve is rarely associated with other frank subjective symptoms of neurosyphilis, except for pain in the legs typical of the tabetic type of neurosyphilis, although it was usually not incapacitating or sleep-disturbing and was in many patients elicited only upon questioning. Diplopia (double vision) was another accompanying symptom of atrophy of the optic nerve. It was usually transitory and invariably preceded, frequently by years, complaint of visual loss.

Duration of Impaired Vision

The duration of impaired visual acuity of the untreated patients in our series varied considerably from a few weeks to months and years. Rarely had symptoms been present more than five to ten years. At times the patient suddenly became cognizant of impaired vision. Typical of the comments are: "My eyes were good until six months ago—all at once when cutting pipe my boss told me I was cutting it crooked." "While driving a car about six months ago, a film came over my left eye." When first seen, the visual acuity of this patient was hand movements in the right eye and light perception in the left.

The degree of visual loss and advancement of optic atrophy existing before the patient becomes aware of impaired sight may be considerable. It is surprising how much impairment of central vision or constriction of peripheral vision may exist before the patient is compelled to stop work. One patient was still working as a general laborer when he came to the clinic. The visual acuity in the right eye was 2/60, in the left eye 6/60.

Some patients became blind in one year or less from the time of their first complaint of impaired vision. These rapidly progressive cases of optic atrophy contributed to the 17 per cent of patients with visual acuity of less than 1/60 (3/200) on admission.

Treatment—Importance of Early Diagnosis

Results[7] of treatment of optic nerve atrophy show that fever treatment especially (induced malaria or vaccines intravenously), combined with penicillin, was effective in some patients in preventing unfavorable progress of the disease. In others, however, despite considerable treatment blindness ensued. In still others the disease became arrested at considerably reduced levels of visual acuity.

Another study[8] reported on patients with neurosyphilis who had normal visual acuity, normal color of the optic discs but who had, on repeated examinations, perimetric field defects. Following treatment such defects disappeared. This was regarded as the earliest evidence of optic nerve involvement—the preatrophic stage preceding degeneration or atrophy of the optic nerve—the atrophic stage. In the latter stage there is some impairment of visual acuity, pallor of the optic discs, and some degree of perimetric field defects. It is very likely that with careful perimetric studies, the diagnosis of optic nerve involvement could be

Boston University
School of Ed...

made in the pre-atrophic stage before the development of the irrevocable impairment of vision observed in the well-established atrophic stage.

To accomplish this early diagnosis necessitates perimetric field study of every patient with neurosyphilis. Such examination should therefore be a routine one. It will then also serve to diagnose optic nerve involvement early in the atrophic stage, before the patient becomes aware of impaired vision.

Optic Atrophy in Congenital Syphilis

As in acquired infection, atrophy of the optic nerve in congenital syphilis is associated with neurosyphilis. According to Igersheimer,[9] 50 per cent of all patients with the tabetic and the paretic forms of neurosyphilis develop optic nerve atrophy.

Atrophy of the optic nerve of congenital syphilis is fortunately much less common than in acquired syphilis. Moreover, as presently discussed, the incidence of congenital syphilis is decreasing. The disease occurs at an earlier age than in the acquired infection. In our series of twenty patients, females predominated (14 of the 20 patients). The youngest was 9 years of age, the oldest was 34 years. The predominating age range when first seen was 13 to 20.

Unless the course of the disease is checked by treatment, blindness is inevitable. These patients remind us of little Hedwig[10] in Ibsen's *Wild Duck:* "Gay and careless and chirping like a little bird she flutters onward into a life of endless night." The implication in the case of Hedwig is congenital syphilis. The cause of impending blindness could be optic atrophy of neurosyphilis or secondary to retinochoroiditis.

Interstitial Keratitis

Interstitial keratitis is an inflammation of the cornea, of syphilitic causation, affecting almost exclusively patients with congenital or hereditary syphilis. It is the second most frequent cause of considerably impaired vision or blindness caused by syphilis.

Females are more affected than males, in a ratio of about 2.5 to 1. Both eyes are invariably affected either in a short space of time or at varying intervals. In a study[11] of 485 patients the predominating age at onset was between the seventh and thirteenth years for females, and the fifth to the twentieth year for the males. Despite considerable treatment, recurrence of the disease is not uncommon, appearing after a variable period from the first attack. In a patient 65 years of age we have observed recurrence 35 years after the initial attack.

The earlier statistics of the final visual acuity of treated patients with interstitial keratitis ranged up to as high as 20 per cent with visual acuity of less than 6/60 (20/200). With more advanced methods of treatment, especially fever, this percentage has been considerably reduced. In a recent study[12] in which fever and penicillin or chemotherapy were employed the percentage of final visual acuity of between 6/60 (20/200) and 1/60 (3/200) of 97 affected eyes of 59 patients was 8.2; and 2.1 where the vision was less than 1/60 (3/200).

In addition to a more favorable outcome of interstitial keratitis on visual acuity compared with optic nerve atrophy is the decreasing incidence of congenital syphilis. We

have noted a decrease in the incidence of the disease at Wills Eye Hospital. This is consistent with the following statistical data. The syphilitic infant mortality rate per 1,000 live births in continental United States in 1933 was 0.79 (both white and nonwhite), whereas in 1948 it was 0.12. The syphilis death rate per 100,000 population for congenital syphilis in 1939 was 1.0, whereas in 1948 it was 0.3.[13]

This decrease in the incidence of congenital syphilis is to be expected as a result of laws requiring premarital Wassermann test and the now current practice of routine Wassermann test in pregnancy, and treatment with penicillin. In consideration of these circumstances congenital syphilis and interstitial keratitis should become an anachronism.

The Problem of Blindness Caused by Syphilis

As aforementioned interstitial keratitis, as part of congenital syphilis, is showing a decreasing incidence and need not be discussed. The problem of optic nerve atrophy of acquired syphilis is of greater magnitude. In our experience there is no evidence of a decrease in its incidence, and therefore it is of grave concern in the prevention of blindness.

The elimination of acquired syphilitic optic nerve atrophy is obviously concerned with measures that decrease the incidence of syphilis, of its spread, its early diagnosis and proper treatment. Another phase is the early recognition of neurosyphilis and its proper treatment. This necessitates routine spinal fluid examination of every person whose infection is of less than about ten years' duration. In this period neurosyphilis is more likely to be diagnosed by spinal fluid examination than by clinical evidence.

Early Recognition Imperative

The early diagnosis of optic nerve involvement, primarily in the preatrophic stage, secondarily in the atrophic stage, should be emphasized. The disease should be diagnosed before it reaches the symptom level of impaired visual acuity, at which time considerable loss of vision may have ensued which cannot be restored by treatment. Diagnosis in this stage is comparable to the diagnosis of cancer by cachexia. Apparently the optometrist is the first to see one third of the early cases of optic atrophy who later attend ophthalmologic clinics. A corollary of this in the prevention of blindness caused by syphilis is not only the education of the public but of the optometrist to recognize pupillary abnormalities as an important symptom of optic atrophy caused by syphilis and to refer the patient to the proper place for study and treatment.

To facilitate early diagnosis of optic atrophy it is necessary that ophthalmologists and all physicians who examine patients with syphilis have a high degree of awareness of the optic nerve. Not only patients with tabes but all patients with neurosyphilis of acquired and of congenital origin should have examination of the optic nerve. In records of private, ward, and clinic patients too infrequently no mention is made of such examination unless the patient complained of visual loss. The ophthalmologists are admirably situated to exclude optic atrophy of every patient examined with syphilis of some years' duration, at least in patients with pupillary abnormalities.

Ophthalmologic Examination in Syphilis Clinics

In syphilis clinics ophthalmologic examination should be made of every patient with neurosyphilis. If routine examination by an ophthalmologist is not possible, physicians attached to the clinic should learn to recognize abnormal pallor of the optic disc and do visual testing. A visual field with the finger by confrontation may furnish a clue to peripheral loss of vision. Selected cases should be referred for more complete examination.

Since optic atrophy occurs predominantly in persons who have no knowledge of infection, industrial and other physicians concerned with routine serologic tests for syphilis of large numbers of persons can aid in early diagnosis. Ophthalmologic examination should be made on persons whose serologic tests are found positive and who present evidence of neurosyphilis, with particular reference to pupillary abnormalities. In the absence of examination by an ophthalmologist, visual acuity, including vision through a pinhole (to approximate corrected vision) and visual field with the finger by confrontation would be better than no examination.

The 10 to 15 per cent of all blindness caused by syphilis (largely atrophy of the optic nerve) approaches that caused by cataract and glaucoma. Syphilis as a cause is deserving of as much attention as is now being given, for example, to glaucoma and to the publicity in the field of industry of the vital importance of the use of guards and goggles in prevention of injury to the eye.

Public Education Needed

We note absence of a comparable educational or propaganda campaign directed toward early recognition of syphilitic optic nerve atrophy. We therefore appeal to ophthalmologists and to the component divisions of the Committee on Statistics of the Blind for more interest in syphilis as a systemic disease, in its public health aspects, its treatment, and in the early diagnosis of optic nerve involvement.

In this day in which the word "syphilis" is no longer tabooed, it would be helpful in an educational campaign to emphasize that syphilis affects the eye as well as other organs and that complete examination should include the optic nerve. This would be far less daring and inoffensive to the aesthetic sense than the implications in the current match cover appeal to the public of the peril of VD.

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RADIATION FROM TELEVISION SETS.—"I believe that at the present time there is no serious danger from radiation in the use of any television tubes presently on the market. The television companies themselves are very much aware of this problem and are having studies made to insure that such hazards do not exist. Actual standards for such performance have not yet been established but measurements made . . . in New York have indicated safety at distances as close as an inch to the screen. I believe it is quite certain that there is no danger to observers at the positions which one would normally occupy when viewing a screen. . . ."—Letter from Lauriston S. Taylor, Chief, Radiation Physics Laboratory, National Bureau of Standards, Washington, D. C.

The Control of Trachoma*

K. W. Cosgrove, M.D.

Little Rock, Arkansas

DESCRIBES present-day practices in the diagnosis, treatment, case finding, field clinics and follow-up in the control of trachoma.

THE loss of vision from trachoma in past years has been excessive, especially in the Far East and the Mediterranean area. Modern treatment and diligent case finding have decreased its ravages to some extent. Better organized search for new cases and a careful check of all possible contacts are necessary to eradicate the disease.

There are three important phases of any trachoma control program. The most important phase is correct diagnosis and treatment. Next in importance comes case finding; and the third phase is follow-up of all patients and contacts, which if not carried out would mean the program would be a complete failure.

Diagnosis

A correct diagnosis is absolutely essential. Positive cases must be treated and made noninfectious. This is the only way spread of the disease can be stopped. One infectious case can transmit trachoma to hundreds, not only in his own family but to school and play mates. Trachoma is divided into four stages, depending upon the appearance of the lid conjunctiva. The first stage is characterized by follicles, and must be differentiated from follicular conjunctivitis. The second stage is easily recognized—the upper lid is beefy red, bleeds easily, has a soft and velvety appearance. In other forms of conjunctivitis, blood vessels show prominently through the swollen conjunctiva, presenting an entirely different picture. The third stage is similar to the second, with yellow or white scarring. The fourth stage is one of pale scarring. The diagnosis cannot be made on lid appearance alone. Pannus must be present, seen either by the naked eye or through the corneal microscope. The blood vessels breaking off from the conjunctival loops into the cornea can be seen with a slit lamp within a few weeks after onset of the disease. I have seen it in a three-weeks-old child whose mother had trachoma.

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The clinical diagnosis can be very accurate if careful study is made of the upper limbus with a slit lamp. Conjunctival scrapings are not necessary, and inclusion bodies may or may not be found. The cytology is typical, according to Thygeson,[1] who says, "Large macrophages (Leber cells) with signs of cell necrosis and predominance of lymphoblasts make a pathognomonic picture." This merely confirms a careful clinical diagnosis made on the criterion that a typical lid and a pannus must be present.

Treatment

The diagnosis having been correctly made, treatment must be instituted. We still use sulfanilamide, following Loe.[2] Sulfanilamide is still used because it has been proved satisfactory and is less expensive. Other sulfa derivatives will give similar results. Penicillin is not satisfactory. Aureomycin will arrest the symptoms, but is expensive. One fifth of a grain per pound of body weight per day of sulfanilamide is divided into two doses, and is given morning and night for ten days. This is supplemented by instillation of a saturated solution of sulfanilamide into the conjunctival sac frequently throughout the day.

In our preliminary report,[3] a number of cases were treated with saturated solution, locally only. This gave apparent relief from symptoms and arrested a great number of patients, but most of these, it was found later, were nonarrested and it was necessary to give oral sulfanilamide. We have not used the other stronger solutions, such as sulfacetamide 30 per cent but I am sure this would be satisfactory, and perhaps better, than the saturated solution.

With this treatment alone, over 90 per cent will be arrested. The dosage may be repeated in six months if complete arrest has not followed. The follicles and lid thickening which are nature's attempt to overcome the disease do not disappear for several months. Cauterization is not necessary if it is a case of trachoma. Sory[4] states that some form of scarification is necessary. We have found that, if given time, the conjunctiva returns to normal in the first and second stages without any local applications. In the few cases still showing follicle formation after six months, the diagnosis can be questioned. The case was probably one of folliculosis and not trachoma. The follicles of follicular conjunctivitis will not disappear. A well-formed pannus never disappears, but the steaminess of the cornea will clear, leaving thin blood vessels, sometimes apparent only after irritation. The patient is noninfectious after seven days, as has been demonstrated by Loe.[5] Surgery is necessary in many of the third and fourth stage cases, because of entropion. The symptoms cannot be relieved while the eyelashes rub on the cornea.

Case Finding Through Public Education

Case finding may be done in several ways. The method of centrally located hospitals with some field work has not proved successful. Patients will not come long distances for treatment. They would rather go blind or even die than be separated from loved ones and friends for long intervals. The new cases of trachoma in Missouri and Kentucky, studied by Hirschfelder, demonstrate this fact. The recent rise in number of cases is probably due to

increased field work and does not represent a true increase in trachoma.

There is no better way to educate the public than by well advertised and conducted clinics, held at definite intervals, especially in smaller localities. The local health personnel must always be on the alert for suspects. School examinations conducted by the nurse and public health officers will find many that may be referred to the clinics. General physicians can also help by referring cases. The newspapers and radio can interest the public in eye examinations. Welfare workers are called upon for eye examinations in connection with their work in blind assistance and remedial care, and many cases will be found among these. It is important that other social agencies also become trachoma-conscious and familiar with the method of referral to a clinic.

All these methods still fall short of perfection, since some people just won't lift a finger to help themselves—even to keep from going blind. We must go out and hunt for them. Many unsuspected cases can be found through complete school eye examinations by an ophthalmologist who knows trachoma. Through the school child with trachoma the rest of the family and other contacts are located. The graph showing the new cases in Arkansas and Illinois (Hirschfelder) demonstrates the decrease in cases of new trachoma, resulting from combined school examinations and field clinics.

Field Trachoma Clinic

Preparation for and conducting of a field clinic requires the following details: (1) a suitable building, such as a courthouse or other public building; (2) sending notice to all interested agencies, newspapers, radio, physicians, school superintendents, etc., several weeks in advance; (3) notifying and instructing all old cases and newly reported suspects to bring everyone with whom they have been in contact to the clinic. Then, on the day of the clinic, all persons attending will be registered, and some form of record prepared. (We have found it most convenient to pin a number on each person, with a corresponding number on his record.) The patient should then be examined by an ophthalmologist using a hand slit lamp. He should note the following data on positive cases: (1) state of conjunctiva; (2) size of pannus; (3) complications; and (4) other ocular diseases. On all positive cases, visual acuity is taken, and the patient is weighed. Treatment and advice are outlined by the local public health nurse. The patient is given instruction in the care of his eyes, not only for his benefit but to prevent spread of the disease. It is explained that trachoma is transmitted by actual contact or by use of common towels, washbasins, pillows, and the patient is, therefore, instructed to use separate towels, washbasin, to sleep alone if possible, and to wash his hands before and after touching his eyes.

Follow-up

The third phase of control is also important. Trachoma does not produce an immunity. For this reason, all members of a family or school or other closely associated group must be examined to prevent reinfection. It is useless to treat nine of a family of ten and leave the other one to reinfect all of them over again. It is very necessary that a close follow-up be made of

each positive case. The entire family, school, and playmates must be carefully checked. It is better to examine a hundred eyes free of trachoma than to allow the public to be exposed to one infectious case.

In one family with eleven children, I diagnosed the parents and nine children. The two unexamined boys were not present—they were out in the woods cutting logs. To insure clearing up the whole family, we gave the parents the tablets for the entire family. Though the two absentees might not be infected, the sulfanilamide would not hurt them. In one family, a definite diagnosis was made on two members. The remainder was apparently normal. We treated only the positive cases. Six months later, the untreated members were positive and had to be treated. It makes one wonder whether that whole family should have been treated even though not all of them showed evidence of the disease at the first examination.

Frequently it is necessary to check to see whether the medicine is taken as ordered. Many excuses are made by an unwilling patient. Some even will stop taking the treatment when they notice their vision improving, for fear of losing their welfare blind assistance. Some might be like the man who embarrassed me before a social service class at the University of Arkansas. When asked how he was, he said, "The medicine didn't do me any good." Asked if he took all of the medicine, he replied, "No. I took one pill and it didn't help me, so I threw the rest away."

It would be interesting to know how many undiagnosed cases of trachoma have been cured inadvertently. The sulfa derivatives have been used for everything from ingrown toenails to brain abscesses—so, how many cases of unnoticed trachoma were cured during treatment for a sore throat or pneumonia?

Conclusion

Experience has proved that the incidence of trachoma can be reduced to a minimum if sufficient interest is aroused to follow through completely a program as outlined in this article.

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Use of Statistics in Planning Prevention of Blindness Programs*

Anne E. Geddes, *Chief, Statistics and Analysis Division,*
Federal Security Agency, Washington, D. C.

BLINDNESS in a substantial proportion of recipients of aid to the blind is due to the fact that prevention measures have been "too little or too late," and the need in the future is for vigorous, well-planned prevention programs to be especially intensified in relation to the progressive aging of our population.

NATIONAL and state agencies concerned with planning programs for the prevention of blindness will wish to consider the effects on the prevalence of blindness of the growth and progressive aging of the population. If we were to assume that the age-specific rates of blindness in 1940, i.e., the number of blind persons per 1,000 population in each age group, were to show no improvement, we should have currently in the United States roughly 22 per cent more blind persons than we had 10 years ago and, by 1960, approximately 43 per cent more blind persons than in 1940.† These projections are based on census data and data from the 1940 *Study of Causes of Blindness Among Recipients of Aid to the Blind.*‡

* Presented at the Joint Conference of the Pan-American Association of Ophthalmology and the National Society for the Prevention of Blindness, Miami Beach, Fla., March 28, 1950.

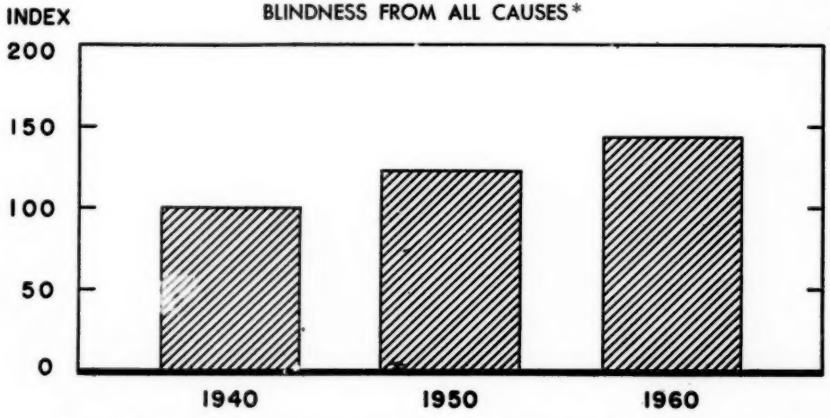
† See chart, p. 111.

‡ Hurlin, Ralph G., Saffian, Sadie, Rice, Carl E., M.D., "Causes of Blindness Among Recipients of Aid to the Blind," Washington Bureau of Public Assistance, Social Security Administration, Federal Security Agency.

Factors Reducing the Prevalence of Blindness

Fortunately, we have probably had in the past 10 years—and doubtless can look forward to in the next 10—a decline in the prevalence of blindness from certain causes. This is undoubtedly due to such factors as the advances of medical science, the improvements in safety measures in industry and the continued efforts of public health, medical care, and prevention of blindness programs. In all probability, the amount of blindness in the United States is currently less than in 1940, and will be less ten years hence, than is suggested by the projection referred to above. This merely illustrates the effects of growth and aging of the population—only two of the numerous factors affecting the extent of blindness. It is to be expected, for example, that the prevalence of blindness resulting from syphilis which, in the 1940 study, was estimated to have accounted for somewhere between 13.5 and 20 per cent of

the blindness among the recipients in the study sample, would decline appreciably as a result of increasing emphasis on the newer types of therapy, premarital blood tests, blood tests for women in early pregnancy, and mass serologies. Trachoma which, in 1940, accounted for the blindness of one recipient in 13, and in one state of more than one recipient in three, is now under relatively effective control. It is to be expected, moreover, that cataract, the largest proportion of which is associated with aging, was estimated to be responsible for the blindness of nearly one person in four. By projecting the age-specific rates of blindness from cataract (assuming no factors offsetting the effects of an aging population), we find that by 1950 the amount of cataract blindness would have increased 26 per cent over 1940 and, by 1960, 51 per cent (see chart, p. 112).



* Assuming no improvement from 1940 in age-specific prevalence of blindness from all causes. [1940 = 100]

immunization, modern treatment methods, or both, will further reduce blindness from such infectious diseases as scarlet fever, measles, and meningitis, which even in 1940 were underlying causes of relatively small percentages of blindness among recipients.

Blindness Associated with Aging

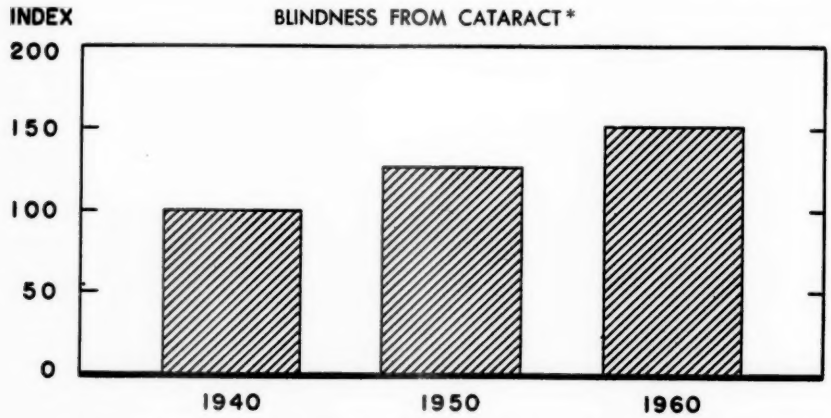
Cataract

If blindness resulting from causes associated with the aging process is to be reduced, efforts at prevention must be redoubled. In the 1940 study, When appropriate medical care is available at the proper time, useful vision can of course be restored for a large proportion of persons with cataract. Consequently it seems surprising that in the 1940 study as many as 4,000 persons in a sample of about 20,600 recipients of aid to the blind should have been found to be blind as a result of cataract. The examining physicians at the time of the most recent eye examination had recommended surgery for slightly more than half of the recipients whose blindness resulted from this eye condition. We

do not know for how large a proportion of these the prognosis was favorable, nor do we know the extent to which facilities or funds were available for providing the recommended surgery for recipients wishing it. In a great many states, however, funds were not available to meet the cost of cataract operations for recipients for whom such surgery was indicated.

That much has been and can be accomplished through state eye treatment programs for persons with cataract is demonstrated by the experience of certain states with such programs. In Indiana, for example, during the years 1936–1945, treatment was provided for 1,217 persons with cataract. For 930 of these persons, visual acuity after treatment was known and could be classified. A total of 835 persons had better than 20/200 vision, 435 of these having better than 20/40 vision. Under the Kansas restoration of sight program, medical care has been provided since July 1946 for 318 cataract patients with vision of 20/200 or less. Of this number, 249 achieved sufficient improvement to remove them from the category of economic blindness. Treatment in this same period was provided to 131 cataract patients with vision of better than 20/200. Of these, 127 obtained improved vision or maintained their vision.

Even when medical eye care can be made available to recipients of aid to the blind, some of them will not wish to avail themselves of it. Persons concerned with preventive medicine have an important task to perform in letting older persons know of the possibilities of improved vision through cataract surgery. The Illinois Public Aid Commission has performed a particularly useful service in publishing information not only on the substantial accomplishments of its treatment program, but also regarding the hesitancy of many persons eligible for eye care to accept treat-



* Assuming no improvement from 1940 in age-specific prevalence of blindness from cataract. [1940 = 100]

ment because of age, physical and mental infirmities, religious convictions, fear, and other factors. Under the Illinois program, according to a report by Dr. Fitzgerald, recommendation for medical or surgical care in the interest of visual restoration or conservation was made for 884 of 6,881 recipients of aid to the blind who were examined. Of these persons, 718 refused and 166 consented to surgery. One hundred and fourteen of the 166 cases having eye operations, all but seven of whom had lens extractions, regained sufficient vision to be no longer considered economically blind.

Glaucoma

With the progressive aging of the population, we can anticipate significant increase, also, in the number of persons becoming blind from glaucoma which, in the 1940 study, was found to be the third most common type of affection, and which accounted for more than one eighth of the blindness. Of persons blind from glaucoma in 1940, it was estimated that nine tenths were 50 years of age and over, and four fifths, 60 and over. If the 1940 age-specific rates of blindness resulting from glaucoma are applied to estimates of population for 1950 and 1960 they indicate a 26 per cent increase in the number of persons blind from this cause in the ten-year period from 1940 to 1950, and a 51 per cent increase in the twenty-year period from 1940 to 1960. The rapid increase in the number of persons in the population of older ages emphasizes the urgent need to detect glaucoma in an early stage of the disease and to provide sustained treatment to conserve remaining vision. This is the responsibility of everyone concerned with preventive medicine.

Prevention Measures for Younger Persons

Emphasis in this paper on eye conditions associated with aging should not be construed as indicating that prevention programs should not also direct their efforts to combat blindness among persons who are young. There is evidence of an increased amount of blindness among children born prematurely. No work could be more important than that directed toward the prevention of blindness which has its onset in early life. Moreover, blind persons of all ages suffering from eye conditions that occur infrequently should have every opportunity for improvement of vision.

Use of Statistics in State Program Planning

In a very few states which have reasonably complete and up-to-date registers of blind persons and which require medical eye examinations for all registrants, the closest approximation of the extent and causes of blindness in the state may be afforded by the register. In most states, however, studies of the causes of blindness among recipients of aid to the blind are probably the best single source of information concerning the relative distribution of particular causes of blindness. State agencies administering aid to the blind with the help of federal funds have for each recipient a record of a medical eye examination prepared by a physician skilled in diseases of the eye. Information on the record includes the eye condition responsible for blindness, the under-

lying cause of blindness, the degree of visual acuity, and recommendations of the physician for medical care to improve or conserve vision. The diagnostic information when systematically classified and tabulated for all recipients indicates the extent of blindness in the recipient group resulting from specific eye conditions and associated with specific underlying causes. The data concerning recipients of aid to the blind should, of course, be supplemented by information from other available sources.

In a given state, the value of statistics on recipients of aid to the blind for the purpose of planning a prevention of blindness program will depend somewhat upon the conditions of eligibility established for the aid to the blind program and also upon agency practices. If a state does not make needy blind children eligible for aid to the blind and provides old-age assistance rather than aid to the blind to all or most needy blind persons aged 65 and over, or if a state with a large Indian population provides aid to the blind for few reservation Indians, statistics for the aid to the blind program in that state will fail to reflect adequately some important prevention problems. Effort then must be made to obtain a complete picture of blindness in the state by obtaining data for excluded groups, from other sources.

Data developed in the 1940 study suggest that the number of blind persons receiving old-age assistance may have been nearly one half the number of persons receiving aid to the blind. We do not know whether the needy blind persons currently receiving old-age assistance constitute a similar proportion of the aid to the blind load. It is certain that considerable numbers of blind persons are on the old-age assistance rolls. Obviously there is need for at least an approximation of the number of blind persons receiving old-age assistance in each state. To obtain such information, the Bureau of Public Assistance is now considering the possibility of a sample study which might employ somewhat the same approach as that used in the National Health Survey of 1935–36. In that survey, which has been widely used and generally regarded as useful despite obvious limitations, information was obtained by lay interviewers regarding the prevalence of disability, including blindness. Visitors of public assistance agencies should be able to determine more accurately than the interviewers in the National Health Survey whether a recipient has such serious visual deficiency as to be technically blind. It would be possible for the visitor at least to give some simple test to determine the extent of visual acuity. Moreover, for some recipients of old-age assistance who are blind, medical eye records are available in the case record.

For the blind children, who also are known to be underrepresented among recipients of aid to the blind, the state may be able to make use of data for children in schools for the blind collected from time to time by the Committee on Statistics of the Blind. Not all blind children, however, are in schools for the blind; moreover, some children attending such schools are not blind, although they have serious visual defects.

It is beyond the scope of this paper to indicate how the data derived from different sources might be spliced together to represent the blind popula-

tion of a state. In the 1940 study the data on both site and type of affection and etiology for the 20 states combined were adjusted for the underrepresentation of persons in the sample in the upper and lower age groups.

If the potentialities of statistics for purposes of program planning are to be realized, current information of the types described are needed. It would be advantageous—if resources should permit—to repeat in the next 2 or 3 years the studies of the aid to the blind loads in a substantial group of states in order: (1) to establish trends in the prevalence of blindness among different age groups; and (2) to afford a firmer basis for broad planning. In some local areas, moreover, it is to be hoped that case-finding projects may be developed under appropriate auspices not only to detect blindness but to obtain diagnostic information that may lead to restoration or conservation of vision among aged persons not now known to the state agency to be blind. Such case finding might be part of a multiphasic screening project.

Conclusion

Abundant evidence of the tragedy of insufficient efforts at prevention in the past is revealed by the 1940 study. The blindness of substantial proportions of the persons receiving aid to the blind is due to the fact that prevention measures have been "too little or too late." In the coming decades, the need for vigorous, well-planned prevention programs will be intensified by the progressive aging of our population. If blindness is to be reduced and visual loss minimized, the concerted efforts of public health, medical care, welfare, and prevention programs under both private and public auspices must be directed to this end.

CORPORATE PRACTICE.—A recent Tennessee Supreme Court decision upheld an injunction by a lower court restraining a Tennessee corporation from engaging in the practice of refraction. The corporation, part of a national chain store company, arranged to have licensed medical doctors on a full-time basis in each of its Tennessee stores do refractions at $2.00 each. Any week that the physician's income did not meet an agreed upon figure, the corporation paid him the difference. In an earlier Tennessee case it had been held that a depending corporation had been practicing optometry, not medicine, and that optometry was not a profession. Subsequently, in 1947, the Tennessee statutes made optometry one of the "healing arts" as a result of which the action against this corporation was successful in restraining it from the practice of optometry. —State ex rel. Loser, Attorney General, v. National Optical Stores Co., 225 S. W. (2d) 263 (Tenn., 1949).

High Lights of Miami Meeting

A coordinated intensive campaign against preventable blindness was the aim of the first joint meeting ever held by the Pan-American Association of Ophthalmology and the National Society for the Prevention of Blindness.

Addressing the opening session of the Pan-American Conference on Prevention of Blindness, in Miami Beach, Florida, March 26 to 31, the President of the Pan-American Association, Conrad Berens, M.D., emphasized the importance of the joint conference as an occasion when both ophthalmologists and prevention of blindness workers exchange experiences, compare notes, and hear about the latest techniques and discoveries in conserving eye health.

Teamwork Stressed

Mason H. Bigelow, President of the National Society, stressed the significance of the meeting as an achievement of teamwork. "Prevention of blindness is a matter that concerns every man and woman," he said. "It calls for teamwork by the doctor, the nurse, the public health official, the schoolteacher, and the industrial safety engineer. More than that, it calls for teamwork by the business executive, the worker in the plant, and the parent in the home."

This keynote of "working together" was echoed in other papers presented during the course of the five-day conference. Professor Alberto Vazquez Barriere, of Montevideo, Uruguay, urged the governments of North and South America to collaborate with private groups in the campaign to prevent blindness. "This fight should be the work of private individuals," Professor Barriere emphasized, "but the state could and should collaborate."

Stressing the relation between ophthalmology and the other branches of medicine, James H. Allen, M.D., of New Orleans, presented the report of the Pan-American Association's Committee on the Teaching of Ophthalmology. Though there has been increasing recognition of these relationships, the committee pointed out, "A phase of graduate training which has been neglected largely in this country has been the training of residents in internal medicine, pediatrics, neurology, and neurosurgery in the ophthalmic manifestations of disease in those fields. . . . Another field which needs development . . . is extension courses for the general practitioner which will teach him to recognize the need for ophthalmic consultation."

A special panel discussion by prevention of blindness workers on the importance of teamwork was featured on the second day of the conference. Among the speakers at the panel was Harry E. Simmons, Executive Director of the Florida Council for the Blind, who described the work of his agency, and reported on the special events being held in connection with Florida's

SANTIAGO BARRENECHEA, M.D., Santiago, Chile; MRS. DOROTHY GRAY, Chicago, Illinois; and CONRAD BERENS, M.D., New York, N. Y.

annual Sight Conservation Week, which was proclaimed by the governor this year to coincide with the Pan-American Conference.

Many of the papers reflected a looking back over the first half of the century to measure progress, and looking forward to map out strategy to be followed for the coming 50 years.

The importance of basic research into the chemical make-up of the body, and of the foods we eat, in order to know more about the causes of crippling eye diseases, was pointed out on the final day of the conference by Thomas D. Allen, M.D., Chicago, who is North American Secretary for the Pan-American Association.

Dr. Moacyr E. Alvaro, Sao Paulo, Brazil, the South American Secretary for the Association, called attention to the fact that "ophthalmology is making more progress in this hemisphere than anywhere else in the world."

During the Miami Beach meeting the Association voted to encourage more intensive research on eye problems by offering three prizes for the best research papers which will be presented at the fourth Pan-American Congress of Ophthalmology, to be held in Mexico City in January, 1952.

"Future plans of the Association call for a research center to be established at some central point to provide a more systematic coordination of eye research in both hemispheres," Dr. Alvaro said. "Last fall the American College of Surgeons in Chicago inaugurated a plan whereby the facilities of its library are extended to any ophthalmologist in any American country. Packages of books and papers are sent on request. In Washington, the Army Medical Museum offers a comparable service on laboratory study. Doctors are encouraged to ship specimens to the museum for pathological study, where local laboratory facilities are not adequate."

Mr. Robert Barnett, Executive Director of the American Foundation for the Blind, in discussing "When Prevention Fails—Then What?" told the doctors how they can help a patient adjust himself to the idea of life without sight.

"There undoubtedly could be offered to you a variety of techniques," he said, "but I believe that the most important key to any technique would be the use by the doctor of his potentially great capacity for understanding human nature and the psychological effects upon the individual of loss of sight. . . ."

New Developments

The 500 ophthalmologists and prevention of blindness workers from 15 American nations who attended the Miami Beach Conference were treated to a number of highly interesting papers dealing with new developments.

Use of ACTH

Dan M. Gordon, M.D., reported on the work being done at New York

Hospital in determining the usefulness of ACTH, cortisone and other steroids. Agents are being utilized in a wide variety of disease processes, but use has not been sufficiently long in duration to warrant the drawing of definite conclusions. Dr. Gordon did say, however, that inflammatory conditions treated have tended to show good results.

Rice Diet

A 150-day rice diet has "proved beneficial" to 80 per cent of a group of patients suffering from high blood pressure, Walter Kempner, M.D., of Duke University told the Pan-American Conference. "But," he added, "the improvement of retinal disease, both in primary kidney disease and in hypertensive vascular disease, does not necessarily coincide with a decrease in blood pressure. Very severe retinopathy has disappeared in patients when the blood pressure remained at a constant high level or showed only an insignificant reduction."

The Antihistamines

P. Robb McDonald, M.D., of Philadelphia, reported that antihistamine drugs are effective against some kinds of eye diseases. He said that researchers have reported "very favorably" on the use of antihistaminics in the control of certain ocular allergies. They found that when 50 patients suffering from ocular allergies were treated with an antihistamine drug, "84 per cent of the patients showed subjective improvement."

In the treatment of nodular episcleritis with an antihistaminic, 21 out of 22 patients "were relieved within seven days," Dr. McDonald said. He added that other experimenters "reported very favorably on the use of antihistaminic drugs in the control of atropine dermatitis and conjunctivitis."

Squint in High Altitudes

Living at high altitudes can cause squint, according to Jorge Valdeavellano, M.D., of Lima, Peru. An inadequate supply of oxygen is probably the cause. Dr. Valdeavellano examined the eyes of Peruvians who had been living for at least six months in regions 10,000 feet above sea level. He found that 60 per cent had difficulty turning their eyes inward to converge on a near object, while 12 per cent of the remainder were suffering from crossed eyes.

Parasitic Diseases

Three doctors from North and South America discussed the problem of parasitic diseases, pointing out that most of these diseases are restricted to tropical regions. However, they are found to a lesser degree in some parts of the United States as well.

Malaria is one of the better known parasitic diseases which may result in

TOMAS R. YANES, M.D., Havana, Cuba; MASON H. BIGELOW, New York, N. Y.; and A. VAZQUEZ BARRIERE, M.D., Montevideo, Uruguay.

blindness. Other parasitic diseases which damage or destroy the eyes: sleeping sickness (trypanosomiasis), yellow fever, sand fly fever, rat-bite fever, tularemia, amoebic dysentery, leprosy and onchocerciasis, (infestation with the filarial worm, producing ocular complications, among other symptoms).

Onchocerciasis is found in America in the coffee-growing areas of southern Mexico and Guatemala. It is estimated that 20,000 persons are infected in Guatemala; inhabitants of an entire village have been blinded by the disease. It is of special importance to doctors in the United States because of the recently opened section of the Pan-American highway south of Oaxaca in southern Mexico. Dr. Franklin M. Foote, Executive Director of the National Society for the Prevention of Blindness, warned that motorists planning to drive in southern Mexico this summer should equip themselves with some of the newer insect repellents to prevent bites from the "coffee gnat" that could mean blindness.

Mrs. Helenor Campbell Wilder gave an interesting discussion of nematodes (roundworms) in the eyes—the first paper of its kind ever presented before a professional meeting. To sum up, in her words:

"Well-preserved nematode larvae were found in three eyes, and degenerated roundworms of a comparable size in four others. Two eyes contained filariae, or filariform larvae. Hyaline fragments in some of these eyes and in eight additional ones were interpreted as a tissue reaction to or a secretion of the parasite, or possibly a combination of the two. In 36 more eyes similar clinical histories and pathologic reactions were so suggestive of a similar etiology that serial sections of all available material on these cases are in the process of preparation.

"Nematodes within the eye as elsewhere are easily overlooked on pathologic examination. In every case serial sections were necessary in order to locate the parasites and fragments, and often to demonstrate the typical lesions. Although the occasional occurrence of parasites in the eye in nematodiasis is well known, it is believed that the role of nematodes in pseudoglioma and possibly Coat's disease has not been adequately recognized."

Contact Lens

A special committee of the Pan-American Association of Ophthalmology reported that the "contact lens is a conquest in ophthalmology but . . . it cannot constitute a replacement for glasses in the majority of cases. . . ."

However, the committee's report, which was read by Baudilio Courtis, M.D., of Buenos Aires, said that contact lenses have benefited people suffering from keratoconus (a deformity of the cornea). Dr. Courtis said that the "chief problem still to be solved is that regarding the contact-lens fluid. . . ." This fluid, which helps the lens adhere to the eye and prevents friction, indirectly causes haziness of vision, the report declared.

Several researchers have designed experimental lenses which do not require a fluid, however, and "results up to the present are very encouraging," to quote the report.

"Ophthalmological Societies," added the committee, "should give the public information upon the present status of contact lenses and warn them against undue propaganda."

Sunglasses

Sun bathers who fail to wear sunglasses are highway hazards who may be the cause of automobile accidents. During the summer of 1949, Dr. Robison D. Harley and Dr. Robert Peckham of Temple University conducted an experiment with 30 Atlantic City lifeguards. They examined the eyes of the lifeguards periodically throughout the season. The doctors found that excessive exposure to the sun without the protection of a good pair of sunglasses damages the eyes by lowering their sensitivity to light; as a result, seeing at night or with artificial illumination is much more difficult.

After excessive exposure to the sun, said the two researchers, you would require a 90-watt bulb in your reading lamp to give your eyes the same amount of light that a 60-watt bulb provided before exposure. Loss of sensitivity can be prevented or reduced by wearing sunglasses that are sufficiently dark to permit about 10 per cent transmission (10 per cent of the light gets through).

Nutrition

Low marks on a school report card may be due to a poor diet rather than a poor I.Q. This suggestion came from a talk by K. E. Miller, M.D., assistant to Florida's State Health Officer. Dr. Miller explained that a public health nurse in Florida recently sent 20 school children to an oculist for vision correction. Eighteen of them were returned with the notation that glasses would be of no benefit. The oculist indicated that nutritional deficiencies were probably the source of the visual defects.

Trachoma

Blindness caused by trachoma has been reduced by 50 per cent during the last 30 years in Missouri, Arthur A. Siniscal, M.D., Medical Director of the Missouri Trachoma Hospital at Rolla, reported at a panel discussion on the disease. Dr. Siniscal said that "although trachoma is still a major problem in the Missouri Ozarks, the outlook has improved greatly during the past three decades. Whereas formerly this disease was responsible for about 25 per cent of the total cases of blindness in Missouri, it now causes only about 12 per cent of the total, or one half as much blindness as previously. This is due to the work of the Missouri Trachoma Hospital, to greater cooperation among patients and referring agencies, and to improved public health education."

Army Tests for Visual Defects

In rejecting 273,000 men for duty during the last war because of visual defects, the Armed Services used devices and methods to test their vision that were "of doubtful reliability and validity," Brittain F. Payne, M.D., of New York, told the conference. He reported that visual defects accounted for 273,000, or 7.8 per cent, of all the men rejected by the services. This number "represents, approximately, the enlisted men for 20 infantry divisions . . . it is virtually certain that many misclassifications were made in not only the group rejected, but among those selected for service."

As a result of these conditions, Dr. Payne revealed that a Subcommittee on Visual Examination—an offshoot of the Army-Navy-National Research Council Vision Committee—is now collecting data to set up uniform stand-

ards for testing visual acuity in the Armed Services.

Air Force Ophthalmology

Colonel Victor A. Byrnes, Chief of the Department of Ophthalmology at the United States Air Force School of Aviation Medicine at Randolph Field, Texas, described recent advances in military ophthalmology. Here are some of the points he made:

Faster-than-sound vibrations occurring during supersonic flight have caused no damage to the pilots' eyes to date.

Repeated studies have failed to develop a filter which would enable infantry riflemen to see objects in a fog.

Pilots flying at high altitudes have found that the sky's brightness is reduced by 30 to 40 per cent because there is less dust and moisture in the air, which reduces reflection of the sun's rays. As a result, other planes are often seen as bright spots on a dark background; on the ground, of course, a plane is a dark spot against a light sky.

Because all the services now have large industrial organizations, eye-protection programs are required, Colonel Byrnes said. "The Navy has recently reported outstanding results in several of its plants. In one plant prior to starting the program in 1946–47, there were 58 eye injuries per million man-hours, with a total of 232 injuries. Ten months later there were no injuries in over two million man-hours worked in a similar period."

For sunglasses, the services have recently made standard for normal use a neutral gray lens of 15 per cent transmission. "This level gives satisfactory visual acuity and at the same time affords adequate brightness protection under most sunlight conditions."

At another session, Colonel Byrnes described the hazards of the high supersonic speed of jet planes which could result in collision before the pilot of either ship could alter his course. He indicated that engineers predict that speed of 1800 miles an hour is not outside the realm of possibility. "If an individual is flying at 1800 m.p.h., he is traveling . . . roughly a mile every two seconds," he said, and pointed out that it would take about four tenths of a second for the image of an oncoming plane to be relayed to the pilot's brain, and that in that time "the pilot has not yet recognized the object, he has only seen it." But in that four tenths of a second, the plane will have traveled nearly one fifth of a mile.

By the time the pilot recognizes the object as another plane, he will have traveled an additional half mile. Another precious quarter mile would be spent in changing the plane's course. All told, the plane will have traveled nine tenths of a mile before the pilot sees the other plane, recognizes it, and then changes his course. If the oncoming plane, traveling at the same speed, were only a mile and a half away, neither pilot would have time to turn. Colonel Byrnes added, "If they came out of the clouds head-on at a distance 500 feet apart, they would collide without either pilot's having seen the other."

Other Papers

Other papers of particular interest to our readers appear in this and later issues of the REVIEW; and some discussions presented during the conference which are of a more technical nature will appear in North and Latin American scientific magazines.

Around the World

WHO and Eye Health

By the very nature of its constitution, the World Health Organization is actively interested in all measures designed to alleviate human suffering and to improve physical and mental health. The promotion of eye health is, of course, an important part of the efforts pursued by the Organization to ensure "the attainment by all peoples of the highest possible level of health." However, because of the limited financial means put at its disposal, the World Health Organization has been directed by its Assembly to establish a number of priority activities (action against malaria, tuberculosis and venereal diseases; promotion of maternal and child care, nutrition, etc.) which lend themselves more immediately to international cooperation. Therefore, with the exception of the trachoma program, WHO plans relating to eye health have been conceived as parts of basic programs to which such priority has been given. The following is a rapid survey of what has been done in this field until now:

Venereal Disease Control

Under the WHO and UNICEF supported programs in seven European countries against syphilis and gonorrhea, and in similar programs to be activated in 1950 for several countries in the eastern Mediterranean, southeast Asia and the Americas, eye infections resulting from these diseases and acquired prior to, during, or after birth, will be treated in infants and children. A systematic examination, including general eye examinations, is carried out in such children.

Of even greater consequence is the stress put on serological and clinical examination of pregnant mothers for syphilis and gonorrhea, in order to prevent eye conditions which may result from such untreated infections.

Maternal and Child Health

The projected work of the Maternal and Child Section of WHO regarding the School Health Program is as follows:

1. The expert Committee on Maternal and Child Health held its first meeting in Geneva in January, 1949 and recommended that the Joint Committee on Health Policy UNICEF/WHO advise UNICEF to undertake the provision of supplies and equipment for programs in these fields. The Joint Committee (UNICEF/WHO) met in April, 1949 and approved this recommendation.

2. Since the autumn of 1949, the Maternal and Child Health Section has been collecting material and information on school health services (medical, research, administrative and statistical data) in preparation for an expert group meeting to be held in August, 1950. A School Health Consultant is being employed for two months to help implement the techni-

cal aspects of this meeting and liaison is being established with UNESCO on this subject. The final agenda of this expert group meeting on school health has not been settled yet, but will unquestionably consider such problems as vision testing, sight-saving classes, school treatment of eye infections, lighting, health education as regards the eyes, case finding, referral and follow-up, etc.

3. As a result of the recommendations of the expert group meeting it is hoped that programs of assistance to school services may be put into practical effect, not only by advice and possibly by consultant service to governments, but also by the supplying of such items as better lighting, photoelectric lightmeters, vision testing apparatus, and other equipment which would improve the general health of the school child.

Epidemiology

The Joint Office Internationale d'Hygiene Publique/WHO Study group on Trachoma held its first session in Paris in October, 1948. In its report (document WHO/Trachoma/1) it recommended that WHO set up an expert committee on trachoma. This recommendation was referred to the second World Health Assembly in June, 1949 and the Assembly approved the formation of the committee in 1950. However, it placed the item on the supplemental budget and it is now not expected that funds will be available in 1950 for a session of the committee.

In 1949 a circular letter was sent to all governments requesting information on the prevalence of trachoma and on its treatment with sulfa drugs. The information on prevalence received in reply to the circular has been incorporated into a paper which is shortly to be published. A report on treatment with sulfa drugs is also to be made.

No session of the expert committee has been envisaged in the 1951 program to be submitted to the third World Health Assembly, the action to be taken being limited to keeping in touch with research and field work carried out by other bodies, the information collected to be made available to interested health administrations and the medical profession.

Supplies

A limited amount of supplies of the newer chemotherapeutic agents have been given to some member governments in the Middle East for the treatment of trachoma.

Non-Governmental Organizations

WHO is in official relationships with the International Association for the Prevention of Blindness.

UN and the Specialized Agencies

WHO recently took part in an interagency conference called by the United Nations and comprised of representatives from UNESCO, UNICEF, IRO, ILO and WHO. This conference considered the problem of the rehabilitation of the disabled and drew up an international program for the rehabilitation of the blind.

MARTHA M. ELIOT, M.D.
Acting Director-General,
World Health Organization,
Geneva, Switzerland

International Association for POB

The meeting of the Executive Committee of the International Associa-

tion for the Prevention of Blindness took place on Tuesday, July 18, at which time there was an administrative report by the President; financial report by the Treasurer; proposals in view of the meeting of the General Assembly; and the awarding of the prize of the International Association for the Prevention of Blindness.

The General Assembly of the Association was held on Wednesday, July 19, and was devoted to the subject of "Nomenclature and Classification of the Causes of Blindness." Professor Arnold Sorsby presented the points of view of Europe and the British Empire; Dr. Conrad Berens, of North and South America; Dr. Toulant, of France and French Colonial Empire; and Dr. Bruce Hamilton, the point of view of Australia.

A resolution regarding the adoption of an international scheme of classification was presented and reports submitted from the various national committees for the prevention of blindness. Election of the members of the staff and of Executive Committee of the Association also took place during the meeting.

Trachoma Throughout the World

Summarizing an extensive epidemiologic report on trachoma, Drs. M. M. Sidky, Epidemiological Studies Section, and Matthieu J. Freyche, Chief, Epidemiological Information Section of WHO, state in the *Epidemiological and Vital Statistics Report* for November–December, 1949:

"1. The incidence of trachoma among school children seems to be one of the most reliable methods of assessing incidence among the population as a whole. Since we are dealing with a disease generally contracted at a very early age, it might be expected that these figures would be higher than those found for the whole population. This is not the case however. We can confirm Victoria's statement that 'the total trachoma density is higher than that among school children.'

"2. There are areas which are little affected or even free from the disease in many very large countries, where it is strongly endemic. However, systematic enquiries undertaken in various places during recent years have frequently shown that areas where the disease was supposed not to exist were really highly infected. This is the case in the central parts of Albania, certain provinces of Argentina (Corrientes, Chaco territory, etc.). Judging from observations recently made in intertropical Africa, it may be that this continent also has similar surprises awaiting future investigations. The same may well apply to Asia. In the present state of our knowledge it would be hopeless to try to estimate the total number of trachoma sufferers throughout the world. Some authorities speak of millions, others of tens or hundreds of millions. Perhaps the most pessimistic figures are those nearest the truth.

"3. Nevertheless, trachoma is no longer universal. When a people has a high standard of hygiene, when the medical body is sufficiently numerous and well trained, the disease vanishes. As we have seen, this is the case in Belgium, Denmark, Great Britain, Luxembourg, Monaco, the Netherlands and Switzerland. Under these conditions, even if new importations of infections (DP's and immigrants) temporarily slow down the decline, the latter still continues (Germany,

Austria, France, etc.). Even when the extent of the endemic was initially appreciable systematically applied measures make it possible to forecast that it will shortly disappear. . . ."

They conclude on the hopeful note that "if the national campaigns already under way are continued and coordinated and meet with vigorous international support, our century may perhaps witness the disappearance of trachoma."

POB in Pakistan

T. Ahmed, Principal of the Dacca Medical College, reports that the Association for the Prevention of Blindness in Bengal which was organized in 1930 has been succeeded, since the partition of India, by the Association for the Prevention of Blindness in East Bengal which was established in March, 1949. President of the new Association is His Excellency, Sir Frederick Bourne, Governor of East Bengal; Mrs. F. Zoha and Mr. T. Ahmed are Joint Honorable Secretaries. East Bengal is part of Pakistan. This new country, with one tenth the territory and one half the population of the United States has approximately the same number of blind—250,000.

The governing body of the Association is composed of 26 members, of whom 21 are nonprofessional. "The inclusion of laymen in the Association," said Mr. Ahmed, "is felt to be imperative, for the question of eyesight, or for that matter, of health, of the people is felt to be not only a professional question but one of concern to every citizen of the State."

The Association holds Blind Relief Camps for treating eye cases, and operates three traveling eye dispensaries on motor vans. Preventive education includes lectures, distribution of pamphlets and posters. Mr. Ahmed appeals for qualified men with the missionary spirit to come to East Bengal to help restore sight to the thousands in need.

Pan American Health Programs, Budget for 1951

The Pan American Sanitary Organization Executive Committee, at its 10th meeting in Washington, devoted most of its sessions to a consideration of the proposed program and budget of the Pan American Sanitary Bureau for 1951. The Committee laid greatest stress on the projected campaigns against communicable diseases, giving particular consideration to the continuation of the campaigns against smallpox, tuberculosis, venereal diseases and yellow fever, as well as continuation and intensification of measures against such public health menaces as brucellosis (undulant fever in man), hydatidosis, onchocerciasis and schistosomiasis.

In reference to onchocerciasis, which is a frequent cause of blindness, the Venezuelan delegate, Dr. Carlos Luis Gonzalez, indicated that this scourge is being studied intensively by the medical authorities of his country, in order to find some means for its eradication.

Passing of Two Great Leaders

William Snow, 1874–1950

The grievous news of the death of William F. Snow, M.D., comes to us as we go to press. Dr. Snow was a member of the National Society's executive committee and of the REVIEW's Board

of Editors, and brought to these posts the wealth of experience, spirituality and leadership which he had attained in his lifetime of service to society. He was a recognized authority in the field of public health, a founder and long-time executive director of the American Social Hygiene Association, and following the recent World War he served as President of the International Union Against the Venereal Diseases.

Dr. Snow early recognized the importance of venereal disease control not only as a general health but a prevention of blindness measure. In 1923, under his aegis, the American Social Hygiene Association cooperated with the National Society in making a study of the relation of venereal diseases and blindness. In 1926 Dr. Snow began his long period of service to the Society, as Board and executive committee member, and he was an active member of the Board of Editors of the SIGHT-SAVING REVIEW since the publication of the first issue in 1931.

There was no problem too great, no question too small, but that Dr. Snow gave it his wholehearted consideration. His counsel and encouragement will be greatly missed both here and abroad.

Harry Gradle, 1883–1950

Harry S. Gradle, M.D., former Vice-President of the Illinois Society for the Prevention of Blindness, died last May 25, at his home in Sherman Oaks, California, where he had made his home following his retirement in 1944. Dr. Gradle was an international authority in the field of ophthalmology as well as the more sociologic aspects of prevention of blindness and sight conservation. During his rich and active career in the field of medicine, he was a Secretary of the Section on Teaching of Ophthalmology, American Academy of Ophthalmology and Otolaryngology; past President of the Chicago Ophthalmological Society; and a contributor to many medical publications. More recently he spent much time and thought on the formation of the Pan-American Association of Ophthalmology, of which he was Honorary President-Founder. In recognition of this leadership, in 1948 he was awarded the first Pan-American Gold Medal, given by the National Society; and in 1946 he received the Leslie Dana Gold Medal in recognition of the place he had made for himself as an ophthalmologist, teacher, writer, and worker in the field of sight conservation. For many years he was a valued consultant for the National Society.

Dr. Gradle is survived by his widow, Mrs. Audrey Hayden Gradle, former executive director of the Illinois Society for the Prevention of Blindness.

Two Pioneers—In Memoriam

The deaths of two outstanding pioneers in prevention of blindness, Lewis H. Carris and John M. Glenn, have struck a grievous blow to the National Society for the Prevention of Blindness. Each has brought honor and stature to the Society, both in achievement and in inspiration. In honoring them, the National Society's Board of Directors passed the following resolutions, expressing the sentiments shared by thousands of others who had the privilege of working with them and knowing them.

Lewis H. Carris, 1869–1950

In the annals of the National Society for the Prevention of Blindness the name of Lewis H. Carris is indelibly inscribed. Mr. Carris served as the Society's administrative officer for seventeen years and was made Director Emeritus on his retirement in January, 1941.

Under his leadership the organized movement for conservation of vision was immeasurably expanded: new goals were set, achievements were multiplied, and numerous additional forces were enlisted in the campaign.

The background which Mr. Carris brought to the Society included wide experience in teaching and in school administration. Many of the state and federal laws on vocational education and industrial rehabilitation now in force he helped to draft as Director of the Federal Board for Vocational Education.

Mr. Carris was Vice-Chairman of the New York State Commission for the Blind and Vice-President of the National Health Council, among many organizations he served in advisory posts throughout the years.

In keeping with his principle that there are no boundaries to the work of hand and mind, Mr. Carris played a major part in the founding of the International Association for Prevention of Blindness in 1929, as well as in the development of its activities.

In 1933 his alma mater, Hobart College, honored him with the degree of LL.D., and in 1942 he was awarded the Leslie Dana Gold Medal for his service in the field of sight conservation.

The measure of a man is more than

Presentation of Leslie Dana Medal to Mr. Carris by Dr. Edward Jackson.

the sum total of the positions he has held, the plans he has formulated and carried out, the talks he has given, the papers he has written. Rather, it is the spirit which informs his words and deeds. Even so condensed an account of his accomplishments as this would be incomplete without reference to Mr. Carris' faculty for warm human relationships and his gift for inspiring wholehearted cooperation and enduring loyalties.

On behalf of the National Society for the Prevention of Blindness, whose cause he so greatly advanced, the Board of Directors pays tribute to the personal and professional attributes of Lewis H. Carris and records with sorrow his death on March 20, 1950.

John M. Glenn, 1858–1950

It is given to few men to attain the eminence in their chosen professions that John M. Glenn achieved in the field of social work. He was one of its most distinguished figures, and the benefit of his knowledge, experience and wise counsel was extended to innumerable organizations.

Perhaps he was most prominently known for his connection with the Russell Sage Foundation, of which he was an incorporator in 1907 and its General Director for a quarter of a century. He was senior author of a two-volume history of the Foundation published in 1947.

The many facets of his interests and his foresight are exemplified by his early recognition of the valuable contribution which a lay movement might make to the elimination of preventable blindness. In 1908 he joined with a handful of public-spirited citizens in forming a committee which was the nucleus of the National Society for the Prevention of Blindness. As a member of the Board and the Executive Committee, as well as of many special committees, he remained an active participant until his resignation in 1938, at which time he was elected an Honorary Vice-President.

For his service to the prevention of blindness field he was awarded the Leslie Dana Gold Medal in 1940.

In recording the death of Mr. Glenn on April 20, 1950, the Board of Directors expresses deep indebtedness to him for his rôle as a founder of the National Society for the Prevention of Blindness and for his guidance in its development.

Presentation of Leslie Dana Medal to Mr. Glenn by Mrs. Anna Harris, in presence of Dr. Conrad Berens.

Current Articles of Interest

The Rôle of the Ophthalmologist in the Conservation of Vision Program, F. C. Cordes, *Journal of Exceptional Children*, April, 1950, Vol. 16, No. 7, p. 193.

Dr. Cordes lists a number of ways by which the ophthalmologist contributes to the conservation of vision program. He determines the ocular and physical conditions causing the child's visual loss and advises the parents as to the importance of carefully planned education. Seeing the child at intervals provides the ophthalmologist with an excellent opportunity to encourage him and prevent the development of psychic emotional reactions. Knowledge of the ocular conditions enables the ophthalmologist to recommend to the educator the amount of work that can be done with the eyes and, also, to determine whether the amount of work done in the past has been injurious or whether there has been enough increase in visual skills to permit more work or even remove the child from the special sight conservation program. On occasion he may be helpful by giving advice as to the selection of a vocation. In conclusion, Dr. Cordes indicates that the cooperation of the educator, the architect, the lighting engineer and the ophthalmologist is important for best fitting the visually handicapped child for an adult rôle of independence.

Age Norms of Refraction and Vision, F. J. Slataper, *Archives of Ophthalmology*, March, 1950, Vol. 43, No. 3, pp. 466–481.

In a review of 35,570 ocular refractions for the purpose of studying age norms of refraction and vision, Dr. Slataper considers, among others, the following topics: changes occurring with age; average refraction for adults; variation in cylinder; comparison of annual age variations in myopia and hypermetropia; menopausal changes in accommodation; old age; senile cataract; prognostic significance; and vision. Concerning menopausal changes, he brings out the point that loss of accommodation is more rapid in women than in men and recommends frequent changes in glasses for women passing through the menopause. He indicates that regarding vision the old reach their second childhood, stating that average vision of healthy eyes with clear lenses for the age of 87 is about the same as that for a child of 1½ years.

Sight Restoration Program of the Cleveland Society for the Blind, C. I. Thomas, *The Ohio State Medical Journal*, January, 1950, Vol. 46, No. 1, pp. 41–43.

The sight restoration program of the Cleveland Society has received donations to date totaling $19,704.17 in the period from February, 1944, to De-

cember, 1948. The following figures show the distribution of expenditures:

1. Hospital	$8,816.47
2. Nursing	5,510.50
3. Research, including laboratory equipment and technician	1,000.00
4. Eyeglasses	1,071.80
5. Medicines	50.93
6. Photographs	30.00

Typical of the surgical procedures carried out by the Cleveland Society were 41 cataract extractions, 18 iridectomies, and 27 corneal transplants. Other operations included discissions, keratectomies, enucleation, and operations for glaucoma.

Keep Eyes on Production, *Occupational Hazards*, April, 1950, Vol. 12, No. 6, p. 21.

Four aspects of industrial safety are considered: functions of color and light, safety color standards, lighting equipment, and maintenance of lighting fixtures. Easier, safer vision is the most important advantage of a correctly painted and lighted work area, but an additional advantage is higher morale. That well-planned lighting pays can be seen by the following examples: one company had 425 accidents in one year, 170 the next, after installing daylight level lighting; and another increased production 9 per cent, cut mending cost 33 per cent after completion of modern light and color installations. Psychological aspects of colors, their various uses, uses of fluorescent and incandescent lamps, and tips on maintenance are presented from the over-all view of seeing effectiveness.

Operation Eyesaver, *Occupational Hazards*, March, 1950, Vol. 12, No. 5, pp. 26–27.

This is the story of how the Naval Ordnance Plant at Alexandria, Virginia, completely eliminated eye injuries. The twelve months following inauguration of the program showed a total of 17 eye injuries, an average of 1.4 per month as compared with nearly 10 for each of the 21 previous months. Since October 21, 1948, there have been no eye injuries. The four-point program begun in September, 1947, included the following: dangerous areas were designated; protective equipment was provided for everyone in hazardous areas; regulations for wearing safety glasses were rigidly enforced; and a program was maintained to develop enthusiasm and support for the campaign against eye injury. Although the saving in human suffering was more important, the dollar saving to the government was $21,600 for one group of 12 workers whose vision was saved by their safety goggles.

Ophthalmology in Relation to Industry, Major Y. K. C. Pandit, *Proceedings of the Society for the Study of Industrial Medicine*, March, 1949, Vol. 1, No. 1, p. 1.

Pointing out that India is on the threshold of large-scale industrial expansion, the author comments on the responsibilities of the ophthalmologist, specifically in connection with the iron and steel industry. Besides treating acute eye diseases and injuries and fitting glasses, the ophthalmologist in India must look for ways to prevent accidents and protect the eyes as well as to devise practical tests for visual acuity for different jobs. At present there is no definite visual

standard for industry. In devising standards, the particular job should be kept in mind so that employees not visually qualified for one task may be hired for another. The author discusses the problems of dark adaptation, routine eye examinations and the eye diseases and injuries common to the iron and steel industry.

Eye Hazards in Industry, Major R. C. Tarapore, *Proceedings of the Society for the Study of Industrial Medicine,* March, 1949, Vol. 1, No. 1, pp. 6–13.

Referring particularly to the steel industry, the author discusses India's industrial ophthalmology problems, which include eye injuries, eye diseases, defective vision and visual standards. His study of 400 persons with visual defects disclosed that 17 per cent had cataracts and 5 per cent had other diseases which made it impossible to correct both eyes to standard with glasses.

Allergy in Ophthalmology, E. W. Hansen, *Transactions,* American Academy of Ophthalmology and Otolaryngology, March-April, 1950, pp. 299–311.

Dr. Hansen discusses conjunctival manifestations of allergy as well as allergies involving the cornea and sclera and uvea. He mentions an increasingly large number of cases, mostly children and young adults with severe symptoms resulting from sensitization to drugs. Indicating that the histories of many of these patients showed that they had been given one of the sulfonamide drugs at some previous time or over an extended period, Dr. Hansen points out the lessons to be learned: to reserve the drugs, particularly the sulfones and barbiturates, for cases of necessity; to be alert for first symptoms of a hypersensitive reaction; and to discontinue the drug immediately when symptoms occur.

Migraine and Its Ocular Manifestations, H. C. Donahue, *Archives of Ophthalmology,* January, 1950, Vol. 43, No. 1, pp. 96–141.

The author discusses history, incidence and etiology as well as many other aspects of migraine. Citing visual involvements, he indicates that he has completed a comprehensive review of over 1,600 cases of migraine and concludes that ocular symptoms occurring during the course of migraine are extremely common. Incidence of visual disorders in migraine with scintillating scotomas and fortification spectrums occurred in 54 per cent of the cases. Various ocular paralyses which occur during migraine were found in 17 per cent of cases. Ocular complications may be observed during all phases of the attack, occurring in various forms and affecting the lids, conjunctiva, iris, pupil, media, optic nerve, retina, retinal blood vessels and extraocular muscles.

The Incidence of Glaucoma, G. D. Phelps, *The Journal of the Iowa State Medical Society,* November, 1949, Vol. XXXIX, No. 11, pp. 519–520.

Dr. Phelps reports his glaucoma cases seen within one year. There were 720 patients, all over the age of 45, of whom 37 (5 per cent) were found to have glaucoma. Of these, 18 had obvious glaucoma and 19 had hidden glaucoma. Average age of those with obvious glaucoma was 75 years, that of hidden glaucoma, 64 years. Dr.

Phelps believes that the routine taking of tension in all patients over 45 years would uncover many more early cases of glaucoma.

Experiment in Glaucoma Case Finding. A Preliminary Report, E. M. Carpenter, S. S. Brav, and V. I. Seidel, *American Journal of Ophthalmology*, April, 1950, Vol. 33, No. 4, pp. 611–615.

This report deals with an experiment in glaucoma case finding initiated by the Philadelphia Committee for Prevention of Blindness, believed to be the first of its kind. A program was set up for mass eye examinations to discover symptoms of early glaucoma in persons aged 40 years and over in stores, plants and insurance companies. Of a total of 3,923 persons screened by ophthalmologists, 65 (1.65 per cent) had glaucoma. Of 24 patients under observation, it is believed that 10 or more will be found to have early glaucoma and that the rate will be close to 2 per cent. The authors believe that for early detection of glaucoma, eye examinations must be available to large numbers of people more regularly and with closer scrutiny and better follow-up than are done today.

Clinical Management of Ocular Syphilis, B. F. Payne, J. A. Goldberg, and J. T. Simonton, *American Journal of Ophthalmology*, April, 1950, Vol. 33, No. 4, pp. 605–610.

Charts of 467 patients from 3 hospitals are analyzed as to syphilitic manifestations in the eye, and treatment administered. Completeness of individual charts is analyzed as to personal history, family history, contact-tracing, laboratory reports, follow-up, disposition and results of treatment on eye condition. The authors arrive at the following conclusions:

"1. Ocular syphilis, although not as prevalent as formerly, is, when present, just as vicious as ever.

"2. Syphilis of the eye is not being treated in accordance with newer developments in therapy in representative hospitals and clinics.

"3. Records and follow-up studies on syphilitic patients are woefully inadequate.

"4. Suggestions for improvement of service and a simplified chart form are offered."

Venereal Diseases in Pregnancy, T. Rosenthal, E. M. Gold, H. M. Wallace, J. B. Faison, and G. Kerchner, *New York State Journal of Medicine*, April 15, 1950, Vol. 50, No. 8, pp. 989–991.

The authors' review of literature yielded the following figures for a number of studies on gonorrhea in prenatal patients: Of a total of 15,015 women delivered in a period of 25 years, 319 (2.12 per cent) had gonorrhea. Of 17,578 pregnant women examined, 260 (1.48 per cent) had gonorrhea. Of 500 indigent antepartum patients, 20 (4 per cent) had gonorrhea, and of 531 women examined about 10 days before delivery, 8 (1.5 per cent) had gonorrhea. The authors' study of over 1,000 pregnant women examined in the prenatal clinics of the New York City Department of Health produced the following results: Of a total of 1,097 pregnant women given serologic tests for syphilis, 73 (6.6. per cent) had positive reactions; and of a total of 1,041 pregnant women examined for gonorrhea, 17 (1.6 per cent) had positive gonococcus cul-

tures. In summary, the authors state that the incidence of gonorrhea was less than expected and that syphilis still exists as an important complication of pregnancy, directly related to congenital syphilis. They believe that the time is not yet here when intensive venereal disease control activities may be relaxed.

Treatment of Retinitis Pigmentosa with Cod Liver Oil Injections and Placental Implantation, S. L. Saltzman and C. Haig, *Archives of Ophthalmology*, March, 1950, Vol. 43, No. 3, pp. 419–430.

The authors evaluate the treatment of retinitis pigmentosa with cod liver oil and placental implantations which was reported by Filatov and his co-workers as highly successful. Their summary and conclusions follow:

"Forty-seven patients with retinitis pigmentosa and 2 patients with retinitis punctata albescens were treated with intramuscular injections of cod liver oil plus subcutaneous and subconjunctival placental implants, according to the methods of Filatov and his co-workers. No significant lasting improvement was observed in visual acuity, visual fields or light sensitivity."

Two Cases of Central Retinitis Pigmentosa, G. Cardello, *Rass. Ital. d'Ottal.* November-December, 1949, Vol. XVIII, Nos. 11–12, p. 396.

The two patients described were aged 63 and 78 years respectively. The first admitted of somewhat reduced vision for a long time but both described fairly recent failure of sight. In each case there was lacking any history of consanguinity or similar affection in other members of the family. Both presented the picture of topeto-retinal degeneration of the area about the macula and a small ring-shaped scotoma surrounded the fixation point; peripheral fields were normal and the pigment particles were similar to those of regular pigmentary degeneration of the retina.

EUGENE M. BLAKE

The Metabolism of the Amino Acids in the Ocular Tissues, M. Vincentiis and G. Auricchio, *Rass. Ital. d'Ottal.*, November-December, 1949, Vol. XVIII, Nos. 11–12, p. 373.

The authors studied experimentally the effects of light and dark upon the metabolism of the amino acids, particularly in the retina. The results obtained by other investigators are also presented. They were able to show that exposure to light resulted in a decrease of the amino acids in the retina and increased the content of ammonia. They attempted to determine whether the retinal process of enzymatic diaminization of the amino acids could furnish energy for the visual function. The results, both *in vitro* and *in vivo*, demonstrated that light has no appreciable influence upon the biological destruction of such substance.

EUGENE M. BLAKE

Beta Irradiation in Ophthalmology, G. M. Haik, *New Orleans Medical and Surgical Journal*, April, 1950, Vol. 102, No. 10, pp. 504–512.

Describing the properties of beta rays, method of application and reactions, Dr. Haik discusses their clinical use in the following ophthalmic diseases and conditions: vernal conjunctivitis, new growths, infections, preoperative and postoperative uses, and glaucoma. In summary, he states that beta irradiation has been established as a method of treatment in certain dis-

eases affecting the internal eye, that it is useful as a preoperative and postoperative measure in keratoplasty and keratectomy, and that it appears to offer some promise in glaucoma by reducing intraocular pressure through control of aqueous production at its source in the ciliary body.

Effect of ACTH on Certain Inflammatory Diseases of the Eye, a Preliminary Report, J. A. Olson, E. H. Steffensen, R. R. Margulis, R. W. Smith, and E. L. Whitney, *The Journal of the American Medical Association*, April 22, 1950, Vol. 142, No. 16, pp. 1276–1278.

The action of pituitary adrenocorticotropic hormone (ACTH) on 7 patients with inflammatory lesions of the cornea and the uveal tract is presented. Dosages ranged from 185 to 432 mg. over a period of 3 to 13 days. The authors state that all patients responded abruptly and favorably to hormonal therapy and that symptomatic relief and distinct objective changes were achieved as early as the second hour in 1 patient and by the fourth hour in the other patients.

Effects of Pituitary Adrenocorticotropic Hormone (ACTH) Therapy in Ophthalmologic Conditions, D. M. Gordon and J. M. McLean, *The Journal of the American Medical Association*, April 22, 1950, Vol. 142, No. 16, pp. 1271–1276.

In this preliminary report the authors emphasize that the number of cases is too small to draw conclusions.

"Pituitary adrenocorticotropic hormone (ACTH) was given to 6 patients with the following diseases: severe corneal edema (corneal dystrophy), secondary glaucoma, chronic iridocyclitis, retinitis pigmentosa and acute choroiditis. The response of the patients with iridocyclitis and choroiditis was dramatic, that of the patient with retinitis pigmentosa apparently temporarily beneficial. The other 2 patients failed to exhibit any favorable response to short courses of treatment. No adverse systemic effects were noted other than temporary hypertension and glycosuria (1 plus) and mild abdominal distention in 1 patient and temporary hypertension in another. . . ."

Cyclotron-induced Radiation Cataracts, P. H. Abelson and P. G. Kruger, *Science*, December 16, 1949, Vol. 110, No. 2868, pp. 655–657.

The authors present a preliminary survey to serve as a warning to research personnel and administrators in the field of high energy particles and to indicate how great the ignorance is concerning radiation effects on higher organisms. When it became known that at least five nuclear physicists were afflicted with incipient cataracts, questionnaires were sent to all high-voltage laboratories where comparable exposure risks might exist, and arrangements made to assemble the afflicted men for comparative medical examinations. The authors provide the findings of the ophthalmologists who concurred as a result of their examinations of 11 of these men. Prognosis for successful surgical treatment of severe cases seems to be good, since there has been no evidence of damage to the retina. Cataracts have been successfully removed in two of the cases. The authors indicate that very little is known about cataracts produced by neutrons, the probable causative agent, and that almost no

systematic neutron research has yet been performed on organisms larger than a mouse.

Atom Bomb Cataracts, D. G. Cogan, S. F. Martin, and S. J. Kimura, *Science,* December 16, 1949, Vol. 110, No. 2868, pp. 654–655.

Preliminary report is made on ten cases of cataracts believed to have been caused by atomic bombs. Nine of the patients were exposed at Hiroshima and one at Nagasaki. All were said to have had normal vision before the bombing. There were seven males and three females, ranging in age at the time of exposure from 13 to 55 years. The latent period of visual symptoms was 6 months in one patient, 2¼ years in another, and 2½ years in four patients. One patient was said to have had subjective visual symptoms one month after the bombing, but it is uncertain that these were due to incipient cataracts. Three patients had no ocular complaints. The authors provide detailed descriptions of these cataracts, which are considered to be similar to those previously associated with exposure to X-rays and gamma rays. The survey was sponsored by the Atomic Bomb Casualty Commission, National Research Council.

Aeromedical Aspects of Jet Propelled Aircraft, III. Problems of Safety in Flight, E. J. Kendricks and A. P. Gagge, *The Bulletin of the U. S. Army Medical Department,* August, 1949, Vol. IX, No. 8, pp. 660–667.

A brief portion of this paper is devoted to the increased demands upon the pilot's vision when flying at the high speeds and altitudes attained by jet propelled aircraft. Split-second vision at greater distances and clear windshields without optical distortion are a prime requisite, placing a premium on high visual acuity. Visual surroundings at very high altitudes change greatly—less haze, much darker sky and more intense sun rays containing a higher proportion of ultraviolet rays. For protection against these, the wearing of sunglasses is more important. The contrast between sunlit areas and shadows is increased, making it harder to see shaded corners of the cockpit as well as sunlit areas where there is more glare. Partial or complete visual blackout during turns and pull-outs must be avoided when possible because of the pilot's reliance on vision for avoiding flight obstacles.

Is Your Boy Color-Blind? F. T. Jung, *Hygeia,* January, 1950, Vol. 28, No. 1, p. 15.

Color blindness is not an all-or-none defect, according to Dr. Jung, who points out that there are many degrees and kinds, and that peculiarities of color vision are as common as those of taste, smell and hearing. A conservative estimate of the number of color-blind in the United States alone is two million, while estimates if more delicate tests are used run as high as seven million. Many destructive attitudes have developed on all sides concerning this handicap and it is the author's purpose to show that constructive attitudes are possible. He recommends that the term "color blindness" be reinterpreted or replaced by a better word to avoid current misunderstandings, and that persons with anomalies of color vision should adopt a positive attitude toward their handicap. They should understand that this handicap

is nearly always inherited and cannot usually be cured by medicines or vitamins. Studies made by the Navy have shown that rehearsing for color tests does not improve color vision but merely improves performance in particular tests. Constructive action is being taken by the American Standards Association to develop an American War Standard for a Safety Color Code, such that can be distinguished by the largest number of color-blind persons. Industries should keep this point in mind also in selecting their color codes, so that otherwise excellent men may be employed.

The Nurse and the Child's Vision, H. E. Weaver, *Public Health Nursing,* April, 1950, Vol. 42, No. 4, pp. 221–223.

Since approximately 80 to 85 per cent of learning is gained through the eyes, the problem of vision in the school health program occupies a prominent place. The nurse in this program has a major responsibility for finding the child with visual difficulties, assisting with eye examinations and interpreting findings to school personnel, parents and the child. The school nurse is not alone in this job but is one of the important members of a team which also includes the school administrator, the teacher, the physician, the health educator, the parents and the child. Home visits provide the nurse with an opportunity for spotting visual difficulties in the preschool child and, upon finding such defects as crossed eyes, she can impress upon the mother the importance of early medical attention. By using volunteers in the school vision testing program and the facilities of existing community service clubs, the nurse plays a vital rôle both in aiding the child in need of eye care and helping to interpret the school health program to the community.

Racial Analysis of Ocular Defects in the Schools of Hawaii, H. E. Crawford and G. C. Hamman, *Hawaii Medical Journal,* November–December, 1949, Vol. 9, pp. 90–93.

The authors report a study of ocular defects in Hawaii's schools, where a program for vision testing and detection of other ocular defects was initiated by the Bureau of Sight Conservation and Work with the Blind. Tables are presented, showing statistics of ocular defects by grade divisions, per cent of ocular defects by school grades and diagnosis, per cent of ocular defects by diagnosis and race, and refractive errors by race. Analysis of these shows an increase in refractive errors with [illegible] a high incidence of myopia in the Oriental races, no significant racial difference in the percentage of ocular diseases, and that strabismus appears to be relatively uncommon. The degree of follow-up and correction of ocular defects appears to be quite high. Mention is made of Hawaii's sight-saving classes which have an enrollment of 43 students in five schools. In general, requirement for admission is vision of 20/70 or less in the better eye. Teachers of these classes have been specially trained for the work.